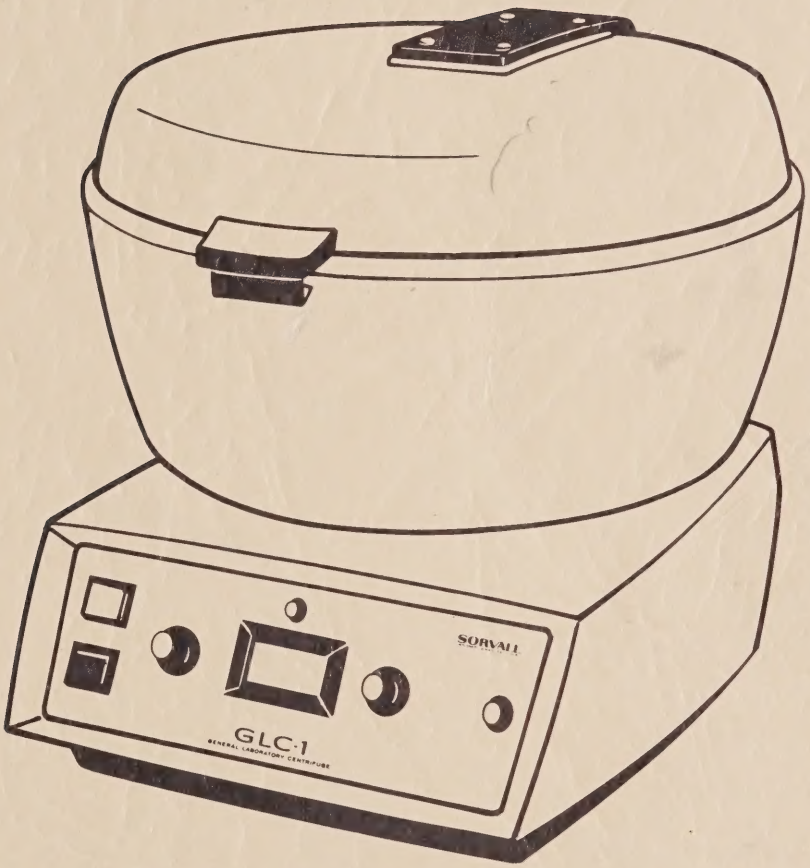
OPERATING INSTRUCTIONS



SORVALL® GLC-1 GENERAL LABORATORY CENTRIFUGE

EXPORT

IVAN SORVALL INC.
NORWALK • CONNECTICUT • 06852

SORVALL

OPERATING INSTRUCTIONS

for the

S O R V A L L

GLC-1 GENERAL LABORATORY CENTRIFUGE

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INTRODUCTION

The *SORVALL* GLC-1 opens a new era of laboratory centrifuge design -- focused on operator convenience, combined with modern appearance. The attractive, yet functional GLC-1, was developed from *SORVALL's* background of long experience in the research centrifuge field.

Features which made *SORVALL* a leader in centrifuge design were included in the basic design parameters and have been made a part of the GLC-1: Gyro-Action Direct-Drive, electric solid state speed control, and rotor interchangeability, to name a few, have been combined with completely new features such as the Twist-Off Removable Guard-Bowl, the full access rotor chamber, the automatic electric brake with flash indicator and the new HL-4 Rotor which, with its combination of carriers, offers a wide choice of tube capacities.

Capable of speeds to 6,000 RPM, RCF to 4,950 x G, the GLC-1 offers rapid acceleration with all rotors, angle or horizontal.

GENERAL DESCRIPTION OF INSTRUMENT

DRIVE SYSTEM

MOTOR	:	specifically designed and built for *SORVALL;* universal type, developing 6,000 RPM with most rotors
GYRO-ACTION DRIVE	:	exclusive, patented design, provides "cushion-smooth" rotor operation combined with wide tolerance for differences in tube weights. Direct attachment of rotors [no tools required]

CONTROL PANEL

MAIN POWER SWITCH	:	illuminated push-button switch activates centrifuge circuit
CIRCUIT BREAKER	:	to protect electrical components of centrifuge circuit
SPEED CONTROL	:	electronic solid-state control for accuracy and reproducibility of runs
FUSE	:	10 amp protector for SPEED CONTROL circuit
TACHOMETER	:	0-6000 RPM; indicates actual rotor RPM
TIMER	:	30 minute timer, synchronous-motor driven, in 30 second calibrations provides accurate control; "hold" provision for longer runs

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Control Panel [Cont'd.]

DYNAMIC BRAKING : illuminated push-button switch lights up when brake is set--flashes when brake is in operation and continues to flash until switch is depressed. May be pre-set before run is started. Brake is automatically programmed to reduce braking force in proportion to rate of rotor deceleration

An additional feature is that the various controls of the GLC-1 may be changed during operation, either intentionally or accidentally, without damage to the component parts of the instrument.

CABINETRY

BASE : a low-silhouette aluminum-alloy casting for exceptional stability; epoxy enamel baked-on finish for durability

GUARD-BOWL : a unique feature, the steel bowl is easily removed, by twisting counter-clockwise, to facilitate cleaning and servicing. Epoxy enamel baked-on finish protects all surfaces

GUARD-BOWL COVER : removable, by removing a hinge pin, the steel cover is also protected by the epoxy enamel baked-on finish

ACCESS PANELS : both Control Panel and Base Panel are easily removed for quick access to component parts and wiring

INSTALLATION

Unpacking

The GLC-1 Centrifuge is shipped in a specially designed heavy-duty cardboard carton which should preclude any damage in shipping.

Unpack carefully. In the event that parts are missing or broken, both the carrier and *Ivan SORVALL, Inc.* should be notified immediately.

Rotors and other accessories ordered are packed and shipped separately.

Installation Procedure

The GLC-1 Centrifuge has been ordered with specific power requirements and should be used only on appropriate service lines. These will be:

115 volts, AC, 60 cycles, single phase, 5 amps

- or -

220 volts, AC, 50 cycles, single phase, 2.5 amps [export only]

The 3-wire cord with 3-prong cap will fit Hubbell receptacle #5261 [115 volts Parallel blades] or #5661 [220 volts Tandem blades] or equivalent.

Installation Procedure [Cont'd.]

The centrifuge may be installed on any sturdy table or bench. The solid base casting plus low silhouette give exceptional operational stability.

Once positioned, the instrument is ready for its initial operation [see page 3].

It is recommended that the complete operating instructions be read before starting the instrument to avoid any unnecessary confusion during operation.

INITIAL OPERATION

To initially "check out" the GLC-1, follow these steps. Thereafter, follow the "OPERATING INSTRUCTIONS" described on page 4. The centrifuge has been Factory-tested prior to shipment and should not require adjustment. Instructions are given, however, in the event that settings have been changed while in transit. To check operation of new GLC-1:

1. Turn Timer and Speed Control to zero [0]
2. Open Guard Cover and remove any foreign materials. PLACE ROTOR ON SHAFT, ENGAGING KEYWAY COUPLING -- PUT HOLDERS OR BUCKETS IN PLACE IN ROTOR -- OPERATE CENTRIFUGE ONLY WHEN ROTOR IS IN POSITION. Close Guard Cover.
3. Plug in line cord; if Red Brake Indicator lights, depress button to turn off; if White Power Indicator lights, depress button to turn off.
4. Turn Speed Control to some low speed [2 or 3 numerals]; turn Timer clockwise for a 2 or 3 minute run. Depress White Power button. Indicator should light and motor start and come up to speed. Depress Red Brake button. Indicator should light but motor should remain running. When the Timer reaches zero [0], or is manually turned to zero [0], a "click" should be heard, the Red Brake Indicator light should begin to flash and the motor decelerate. The Timer will "click" once more, shutting off its own synchronous motor. The Red Brake Indicator will continue to flash until the button is depressed to turn Brake off.
5. Turn Speed Control to some low speed [2 or 3 numerals]; turn Timer counterclockwise to "Hold" position; depress the White Power button. The motor should accelerate to speed. Increasing the setting on the Speed Control should increase the motor speed. Do not exceed the recommended Limiting Speed for rotor being used.
6. With the Speed Control set at zero [0], the rotor should remain at rest. A gradual increase in the Speed setting should cause the rotor to rotate slowly. To adjust, if necessary, turn Control to zero [0]; using a screwdriver through the access hole next to the fuse, turn the adjustment screw until the rotor begins to turn slowly; then turn back until rotor stops.
7. Check Tachometer by observing if pointer indicates zero [0] at stop; adjust, if necessary, by turning adjustment screw below tachometer dial.

OPERATING PROCEDURES

IMPORTANT: OPERATE CENTRIFUGE ONLY WHEN ROTOR IS MOUNTED

Through its designed simplicity, the GLC-1 Centrifuge is easily operated. Controls are conveniently located and clearly marked. Basic operation involves two steps: A] Mounting the rotor and B] Setting the controls.

A] *MOUNTING OF ROTORS*

The Gyro-Action Self-Centering Drive is equipped with a keyway coupling which engages a matching coupling in the rotor, providing a non-slipping power connection.

Rotors are mounted directly on the drive shaft; make sure the keyway couplings are engaged; there is no further connection necessary and tools are not required. BALANCE is an important factor for the smooth operation and long life of the centrifuge.

The rotor load, including trunnion rings, holders, tubes and specimen, should be in equal balance with the opposing load, when using the HL-4 Rotor.

The standard balancing procedure should include:

1. Place opposing loads, including trunnion rings, holders, tubes and specimen on balance
2. If possible, achieve balance during loading of specimen, or, alternatively, add water as balancing agent to holder
3. After balancing one opposing pair of holders, repeat the process for the second pair

B] *SETTING THE CONTROLS*

For Manual Operation:

1. Check that Speed Control and Timer are both set at zero [0], and Power Switch "OFF"
2. Mount Rotor on spindle
3. Pre-set Timer to desired period
4. Press Main Power Switch "ON"
5. Using Speed Control, accelerate to desired speed. For rapid acceleration, advance Speed Control knob fully [to 10], then reduce setting as motor speed approaches level desired.
6. If Dynamic Braking is desired, push the Brake Switch [illuminated when "ON"]; this will automatically engage the Brake when the timed interval runs out. [If in the "Hold" position, the timer must be switched manually to "0" to activate the Brake]. If "ON", the illuminated Brake Switch will flash during braking and will continue flashing until switched "OFF".

B] *Setting the Controls* [Cont'd.]

For Automatic Operation:

1. Check that Speed Control and Timer are both set at zero [0], and Power Switch "OFF"
2. Mount Rotor on spindle
3. Pre-set Timer to desired period
4. Pre-set Speed Control to desired period
5. Press Main Power Switch "ON"; this will start the centrifuge
6. Set Dynamic Brake, if desired, by pushing button "ON" [illuminated when "ON"]; this will automatically engage the Brake when the timed interval runs out. The illuminated Brake Switch will flash during braking and will continue flashing until switched "OFF".

PERFORMANCE

The Speed Control dial is calibrated to 10 Index Points which are for reference only. They do not represent a given speed. The GLC-1 tachometer will indicate the actual rotor speed [RPM].

If the GLC-1 will be used for repetitive runs, it is suggested that the speeds at various Index Points be recorded to guide pre-setting the Speed Control.

Maximum recommended Rotor Speeds are:

6,000 RPM	A, XL, M, SP, SP/X
3,200 RPM	HL-4 with 50 ml Buckets
2,600 RPM	HL-4 with 100 ml Buckets or Omni-Carriers

TEMPERATURE DIFFERENTIAL

Rotor temperature rise accompanies any type of centrifugation. The design of the GLC-1, with its large Rotor Chamber, holds this rise to a minimum. The actual amount of temperature change will be dependent on a variety of factors; ambient temperature within the chamber, rotor speed, length of run, whether centrifuge is already "warmed up", the temperature of the specimen, tube and holder and similar variables. Experimentation prior to running temperature-sensitive materials is recommended.

CARE AND MAINTENANCE

The GLC-1 Centrifuge has been specifically designed and engineered to provide reliable, trouble-free performance. All components have been manufactured or selected for quality and durability. Wherever possible, features to simplify maintenance and service have been incorporated.

Cleanliness is important for reliable instrument performance. *SORVALL's* unique Twist-Off Removable Guard-Bowl is an outstanding advance to make cleaning easier; the entire bowl, by turning counter-clockwise, may be taken off and washed in a sink; the cover is equally easy to remove by pushing out the hinge pin.

The Guard-Bowl and Base are finished in an attractive, durable 2-tone epoxy enamel which should be cleaned with any standard detergents.

The electrical and mechanical portions of the centrifuge are similarly designed for ease of maintenance: the Control Panel is easily removed and major controls utilize plug-in connections. The motor itself is easily removed from the base through the top for checking and changing brushes.

By design, all rotor weight is supported by the Gyro-Action Drive, not by the motor. Consequently, motor bearing life is longer than normally anticipated. All bearings are sealed and require no lubrication.

SERVICE SUGGESTIONS

To remove Rotor Guard-Bowl: raise cover, remove the seal from the base of the Drive Assembly, and twist Guard-Bowl counter-clockwise to release the bayonet-type lock. To replace, reverse procedure.

To remove Rotor Guard Cover: push out the hinge pin which secures the cover to the rear support arm.

To remove Gyro-Action Drive Assembly: for ease of handling, remove the Guard-Bowl as described above. Remove the slotted screws from the Mounting Plate and lift centering assembly out.

To remove Motor: disconnect line cord from wall receptacle. Remove the Guard-Bowl. Remove the Allen head socket screws from the lower plate; lift motor out using Gyro-Action Drive as a handle. Unplug wiring harness. Reverse procedure to replace.

Service Suggestions [Cont'd.]

To remove Control Panel: disconnect line cord from wall receptacle. Remove 4 corner screws and lift panel forward. Unplug Control Panel wiring from Base Panel.

To remove Base Panel: disconnect line cord from wall receptacle. Remove Guard-Bowl; turn GLC-1 on side; from bottom, remove 4 corner screws and lift panel out. Unplug Control Panel and Motor wiring from Base Panel.

CONTROL PANEL CIRCUITRY

The following describes the removal and replacement of the individual components on the panel. Refer to Trouble Shooting Chart following for recommended tests to determine which component should be checked or replaced. Remove panel as described previously and disconnect the in-line plug from the Base Panel circuitry.

Power and Brake Switch: disconnect leads, note where they attach and the orientation of the switch; push switch out from the rear of the panel; replace with new switch, re-connect leads as before.

Timer: disconnect leads, mark by terminal number; remove control knob, hold-down nut and lock washer; remove timer from rear of panel; remove two [2] screws from back of timer to release special mounting plate; install plate on new timer, use aligning holes in panel to mount. Reverse procedure to re-connect.

Circuit Breaker: disconnect leads; remove mounting nut from front, remove breaker from rear. Reverse procedure to replace.

Tachometer Trimmer: unplug trimmer from line and from tachometer; remove from mounting bracket. Insert new trimmer mounting tabs through holes in bracket and twist tabs 90° to securely mount. Re-connect leads as before.

Tachometer: remove leads; remove bracket from rear of panel by loosening thumb screws; remove tachometer from front of panel. Tighten quick-connect terminals of new tachometer before inserting into panel. Reverse steps to replace.

Control Panel Circuitry [Cont'd.]

Speed Control: unplug leads to Control Panel assembly [3 circuit plug]. Remove knob, hold-down nut and lockwasher from front of panel. Remove control from the rear. Reverse procedure to replace. Because of electronic components, it is recommended that the Speed Control be returned to *Ivan SORVALL, Inc.* should repairs be required.

BASE PANEL CIRCUITRY

Remove Base Panel as described above. Disconnect in-line plugs to Control Panel and motor.

Brake Resistor: Cone-type resistor screws into socket mounted on base plate. Unscrew counter-clockwise to remove.

Hart Relay: plug-in unit. Release hold-down clamp and lift out to remove.

Brake Diode: mounted to angle bracket at front of panel. To remove, unplug lead to relay and remove hex nut from mounting stud. When replacing diode, be sure that insulating hardware is in good condition.

Flasher Diode: mounted to component board, soldered.

MOTOR BRUSH INSPECTION AND REPLACEMENT

REMOVAL OF BRUSHES

There are two [2] methods which may be used:

A. With Motor in place: remove and disconnect the Control Panel. Using a stubby screwdriver, remove the two black plastic brush caps at the bottom end of motor. Noting orientation of brush in brass holder, withdraw the spring and brush assembly.

B. With Motor removed: remove protective seal from the base of the Drive Assembly, twist off Guard-Bowl, unscrew 4 Allen head screws on Motor Mount Plate. Remove Motor, Gyro-Action Drive Assembly and Motor Mount as a unit. Unplug the motor cord. Remove brushes as described above.

Brush Inspection: overall length of brush, when new, is approximately 1". Brush should be replaced when worn down to 1/2" overall length or less. Measurement includes 1/8" shoulder over which brush spring fits. Use Cat. No. PM-61924 Carbon Contact Brushes.

Motor Brush Inspection and Replacement [Cont'd.]

Motor Inspection: If the motor is removed, it is advisable to visually inspect the motor commutator for wear. The surface should be smooth and evenly brown in color; if it is scored or grooved, the commutator should be turned down by a reputable electrical service shop or by the *SORVALL* Service Department.

Brush Replacement: essentially the reverse of the procedure described for removal, there are two important points to be noted.

1. If previously used brushes are re-installed for additional wear, they should be replaced in the same holder and in the same orientation as they were when removed. This will reduce arcing when motor is operated.
2. When replacing the black plastic brush caps, care should be taken to ensure that the "ears" of the brush spring retainer are seated within the slots of the brush holders in the motor.

TROUBLE SHOOTING CHART

SYMPTOM	POSSIBLE SOURCE	REMEDY
Master Power Switch "ON" but not illuminated and centrifuge will not operate	1. House line 2. Centrifuge circuit overloaded 3. Power Switch	1. Check house line fuses 2. Press circuit breaker button on Control Panel 3. Check switch, replace if necessary
Centrifuge motor operates, but rotor remains stationary	1. Sheared drive coupling	1. Check both upper and lower couplings in Gyro-Action Drive
Master Power Switch "ON", Speed Control and Timer set, but motor does not run	1. Speed Control 2. Timer 3. Relay 4. Brushes	1. Check Speed Control fuse, replace if blown 2. Check Timer; turn to "HOLD" or to timed run 3. Check Relay [should "click" when Timer switched "ON"] 4. Check and replace brushes
Motor runs, but Tachometer does not operate	1. Tachometer Generator 2. Tachometer Trimmer open 3. Tachometer meter	1. Check Generator output [5 volts per 1,000 RPM], replace if necessary 2. Check resistance with Ohmmeter* and replace if necessary 3. Check full scale deflection of meter [27 v.a.c.]; replace if necessary
Brake does not operate	1. Brake Switch 2. Brake Resistor 3. Brake Diode 4. Relay	1. Check for loose connections; with power "OFF", check for Continuity with Ohmmeter* between line and load 2. Loose in socket; broken coil wire; with power "OFF", check with Ohmmeter* [2.7 ohms across connectors] 3. With power "OFF", check with Ohmmeter* [5-25 ohm one way, essentially open the other] 4. Should "click" when turned "ON". With relay removed, Ohmmeter* reading between Contacts #1 and #2 should read approx. 250 ohms
Brake operative but light does not "flash"	1. Defective flasher diode	1. With power "OFF", check diode on component board with Ohmmeter*, check 10-20 ohms one way, essentially open the other; replace if necessary

TROUBLE SHOOTING CHART [Cont'd.]

SYMPTOM	POSSIBLE SOURCE	REMEDY
Speed Control blows fuse continually	1. Control circuitry	1. Check for short-circuited wire; return to Newtown for repair or replacement
Centrifuge makes rasping noise	1. Motor Bearings 2. Gyro-Action Drive bearings	1. Remove motor and Gyro-Action Drive as if to change brushes; accelerate motor; if noise persists, replace motor bearing 2. If no noise, check Gyro-Action Drive by manual spinning; replace if necessary

*In checking components with Ohmmeter, make sure one end is disconnected and is open-circuited.

SERVICE

Should correspondence regarding the Centrifuge be necessary concerning replacement parts or repairs, be sure to state the Type and the Serial Numbers of the centrifuge motor or rotor. The GLC-1 Serial Number is located under the bottom lip of the Control Panel. A Spare Parts List and Price List are included with these instructions for reference. When ordering, please specify part number and description.

WARRANTY

The *SORVALL* Centrifuge, furnished by *Ivan SORVALL, Inc.*, is warranted to be free from defects in material and workmanship for a period of one [1] year from delivery thereof.

The company will repair or replace and return, free of charge, any part thereof which is returned to its factory within said period, transportation prepaid by the user, and which is found, upon inspection, to have been defective in materials or workmanship. This warranty does not include normal wear from use, it does not apply to any instrument or part thereof which has been altered by anyone other than an employee of *Ivan SORVALL, Inc.*, nor to any instrument or part thereof, which has been damaged through an accident, negligence, failure to follow operating instructions, the use of electric currents or circuits other than those specified on the plate affixed to the instrument, use beyond the specified capacity of the instrument, misuse or abuse. *Ivan SORVALL, Inc.* should be notified immediately upon discovery of defects.

No Warranty other than that above mentioned is given nor shall be implied. *Ivan SORVALL, Inc.* accepts no contingent liability and shall in no event be liable for consequential damages. In line with its policy of Progressive Research, *Ivan SORVALL, Inc.* reserves the right to change or revise any part or parts without being obligated to make corresponding changes, improvements, additions or replacements in any centrifuge or rotor previously sold or shipped.

A Warranty Certificate and Return Card are enclosed with these instructions; the Certificate should be retained for your records; the Return Card should be filled out and sent to *Ivan SORVALL, Inc.* immediately upon receipt of the centrifuge.

SELECTION AND USE OF CENTRIFUGE TUBES

Ivan SORVALL, Inc. offers a wide range of glass, plastic and stainless steel tubes suitable for almost every laboratory application.

Appended to these instructions are Rotor Bulletin Sheets describing the A, XL, M, SP and SP/X Angle Rotors and the HL-4 Horizontal Rotor with the 100 ml, 50 ml buckets, or Omni-Carrier Holders. These Rotor Bulletin Sheets describe the *SORVALL* Centrifuge tubes which may be used in each rotor, indicating the Catalog Number of the cover, if available, and the Catalog Number of the adapter, if required. Recommended Limiting Speeds are given along with an RCF Chart, illustrating the Speed/Relative Centrifugal Force relationship.

SORVALL tubes are, of course, recommended, but tubes available through other suppliers may be used providing they are of equal strength and dimensions.

Should tube breakage or spillage occur, remove all fragments and clean all parts as soon as possible.

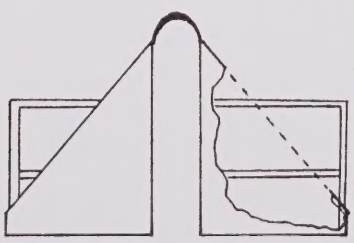
HL-4 ROTOR NOTES

It should be pointed out, particularly when using the Stainless Steel Inserts with the Omni-Carriers, that because of space limitations, the diameters of the tube holes are held to close tolerances.

Due to these tolerances, in combination with less strict dimensions held by some tube manufacturers, there may occasionally be found "oversized" tubes which will not fit into the tube holes.

It is recommended that tubes be fitted to the rotor compartment [or Insert], prior to filling with specimen to ensure their fit.

When using the Omni-Carriers, make certain that the Inserts are fully seated in the holder; otherwise damage may result.



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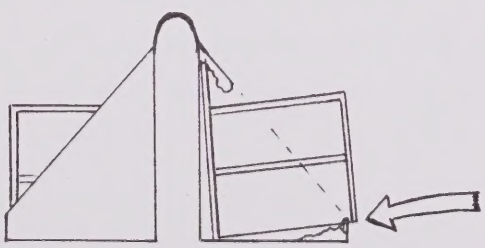

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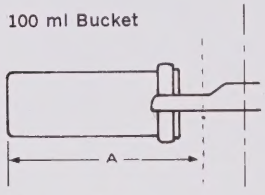
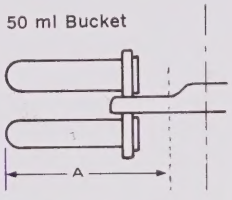
TUBE LENGTH

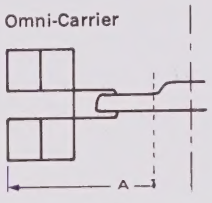
A wide variety of tubes may be used with the HL-4 Rotor but particular attention should be paid to the length of tube used. Because of the configuration of the Rotor and the arc through which the tube will swing, there is a limitation of tube length with each Bucket and Insert.



A = 150 mm



A = 130 mm



A = 125 mm

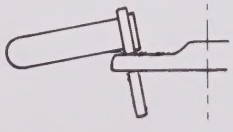
ROTOR BALANCING

It is necessary, for smooth, effective centrifugation, to have the rotor load balanced. If less than a full complement of tubes are being run, they should be placed in opposing rotor compartments. As pointed out in the section "Mounting of Rotors", balance with the HL-4 Rotor is important for smooth operation. To assist in balancing, the trunnion rings [both 100 and 50 ml sizes] are stamped with their gram weight. Trunnions run in opposing positions in the rotor should be of equal weight. Should additional trunnions be needed, indicate gram weight of trunnions on hand or purchase new ones in matched pairs.

To repeat the recommended standard balancing procedure:

1. Place opposing loads, including trunnion rings, holders, tubes and specimen on balance
2. If possible, achieve balance during loading of specimen or, alternatively, add water as balancing agent to holder
3. After balancing one opposing pair of holders, repeat the process for the second pair

Further, when using the 50 ml Buckets or Omni-Carriers with the HL-4 Rotor, if both buckets or both sides of insert are not equally loaded, there will be a tendency for the bucket or carrier to find its center of weight during centrifugation which may affect its horizontal operation. A balance tube [or tubes] should be used to avoid this condition.



SORVALL®

GLC-1

GENERAL LABORATORY CENTRIFUGE

IVAN SORVALL INC.
NORWALK • CONNECTICUT • 06852

SORVALL® GLC-1

GENERAL LABORATORY CENTRIFUGE

The SORVALL GLC-1 is the first general laboratory centrifuge to offer the features, quality, and versatility of a high-priced research centrifuge in an inexpensive, compact, bench-top model. In producing the new GLC-1, SORVALL has utilized all of its many years experience in designing and manufacturing precision instrumentation for the research and the analytical market. The result is a general laboratory centrifuge of ultra-modern design having advantages such as Gyro-Action Direct Drive, Automatic Controls, Full-Access Rotor Chamber, Removable Guard Bowl, Angle and Horizontal Rotor Versatility, large capacity, RCF's to 4,950 x G, safety and convenience in use, and a modest price. The following pages detail the many reasons why the GLC-1 General Laboratory Centrifuge is designated indispensable in any lab doing a wide variety of separations, or requiring instrument reliability.

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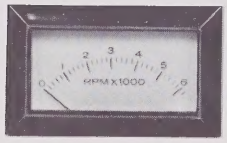
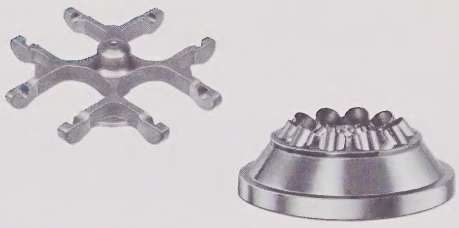
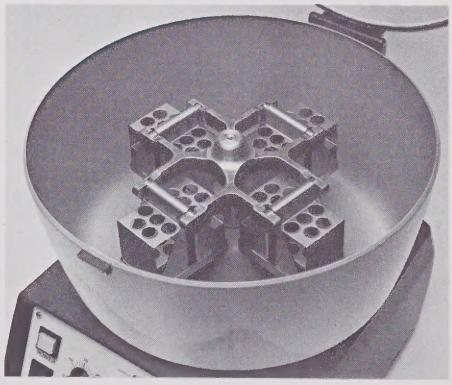
FEATURES:

- RCF's to 4,950 x G
- Speeds to 6,000 rpm
- Exclusive Gyro-Action Self-Centering Drive (Patented)
- Rapid Acceleration even with large loads
- Automatic Electric Brake — can be pre-set at beginning of run — flashing indicator during and following braking cycle
- Twist-Off Removable Guard-Bowl
- Full-Access Rotor Chamber
- Angle Rotor capacities to 575 ml.
- Horizontal Rotor capacities to 400 ml.
- Electric Tachometer 0-6,000 rpm (optional)
- Thirty-Minute Timer (graduated in 30-second intervals) with "hold" provision
- Electronic Solid-State Speed Control
- Accepts standard tubes to 150 mm in length
- Wide range of Adapters including Omni-Carrier with removable Stainless Steel Inserts for 10, 12, 13, 16, 18 mm diameter tubes
- No tools needed to secure or remove rotors
- Easily absorbs tube imbalance — visual equalization only
- Heavy-Duty Motor — reserve power
- Long brush life
- High-quality components and workmanship
- Two-tone epoxy enamel finish for easy cleaning
- Stable — Compact — Space Saving — Quiet
- Ultra-modern design and styling







THE SORVALL® GLC-1 CONTROL PANEL

Simplicity, legibility, and convenience keynote the GLC-1 control panel. All controls are mounted on a stylishly-functional, angled front panel. Power and brake indicator lights may be seen easily at across-the-laboratory distances. Panel is speedily removed for servicing, and major components have plug-in connectors for rapid assembly and disassembly.

MASTER POWER SWITCH — Activates centrifuge circuit and remains illuminated until power is switched off.

ELECTRIC TACHOMETER — Indicates rotor rpm at any time during run. Cross reference to a SORVALL RCF Chart can determine G forces being exerted.

CIRCUIT BREAKER — Designed to accept momentary starting overload. Prevents electrical overload from damaging centrifuge components.

FUSE — A 10 amp fuse is provided as separate protection for the speed control.

DYNAMIC BRAKING — Automatically programmed to reduce braking force in proportion to rate of rotor deceleration. Smooth, controlled braking avoids resuspension of sediment. Illuminated push-button switch lights up when brake is set — commences flashing when braking cycle begins, and continues until brake switch is depressed.

TIMER — A 30-minute synchronous motor-driven timer calibrated in 30-second intervals, gives accurate control of centrifuging procedures. Timer also has built-in "hold" provision for longer runs as required.

SPEED CONTROL — A solid-state speed control (unavailable in any other centrifuge in this price range) accurately delivers the required rotor speed. Special, heavy-duty motor provides all the reserve power any lab will need even under maximum load and long-duration runs.

NOTE: A model GLC — similar in all respects to the GLC-1 described herein, but not having the electric tachometer — is available at a slightly reduced cost. See separate price list.

WHY THE GLC-1?

More convenience, greater versatility, outstanding performance, and practically no maintenance are some good reasons for having the GLC-1 in every laboratory, where many various centrifuging tasks are handled routinely. From the automatic controls to the high-quality engineering and components there is no other table model, general laboratory centrifuge that can offer so much. Large loads (up to 480 ml. with horizontal rotors; to 575 ml. with angle rotors) can be processed at high RCF and rpm with power to spare. Easy cleaning and portability, wide rotor and adapter selection, and smooth, gyro-action operation are unmatched by any centrifuge near the GLC-1 price range. The extensive speed and RCF available with the GLC-1 provide a bonus in reduced centrifuging times. This general laboratory centrifuge also facilitates separations which previously required more expensive equipment.

Gyro-Action Drive

The Gyro-Action Self-Centering Direct Drive of the GLC-1 is the smoothest, safest drive available in any laboratory centrifuge. Its keyway coupling design eliminates motor slippage, and accepts the direct seating of all rotors without the use of tools. Dynamic action accommodates discrepancies in tube loads, and permits visual equalization of tube contents. This is the same drive used and proved for many years in SORVALL's Superspeed Centrifuges. It provides faster, more complete separation, and helps to maintain that separation during the critical period of deceleration. IT IS A SORVALL PATENT, AND HAS NEVER BEFORE BEEN OFFERED IN ANYTHING BUT RESEARCH CENTRIFUGES. Its reliability and performance contribute speed and safety throughout its complete operating range, and as it supports the entire weight of the rotor it reduces motor wear.

Safety Guard

The safety guard of the GLC-1 is a unique concept. It permits full diameter access to the rotor chamber, and gives the operator great convenience when securing or removing rotors. Also, the guard itself is removable for cleaning. It is fitted to the cast aluminum base by a sturdy, bayonet-lock. It can be quickly and easily turned from the base and taken to a sink for washing. Operators who have attempted to clean a centrifuge chamber after a tube breakage will especially appreciate this SORVALL feature. The guard cover may also be removed from its bracket by snapping out a hinge pin.

Safety Features

- **Steel rotor guard and cover with safety lock to protect operator from contact with spinning rotor, and from possible tube breakage**
- **Smooth-contour design eliminates sharp projections**
- **Gyro-Action Direct Drive for vibrationless, safe operation — absorbs tube-loading imbalance**
- **Solid base casting and rugged engineering throughout, plus low silhouette, give far greater operational stability than any other centrifuge in this range**
- **Safety interlocks, circuit breaker, fuse, protect circuits and components**
- **CSA and UL approved**
- **Neoprene seal around base of drive protects motor and electrical components from spillage**
- **All controls clearly marked**
- **Controls may be altered intentionally or accidentally during operation and the centrifuge will respond smoothly without harmful effect**

Maintenance

The GLC-1 has a two-tone, epoxy enamel finish for durable appearance. The removable guard can be carried without effort to a sink for cleaning. Long motor brush life, sealed-in lubrication of all bearings, easy access to working parts, and plug-in connections between components ensure minimum service time. All rotor weight is borne by the self-centering drive, not by the motor as in competitive centrifuges. Consequently, motor bearing life is longer than normally anticipated.

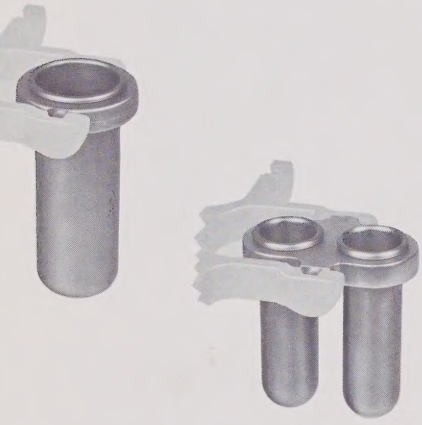
ROTORS & CARRIERS

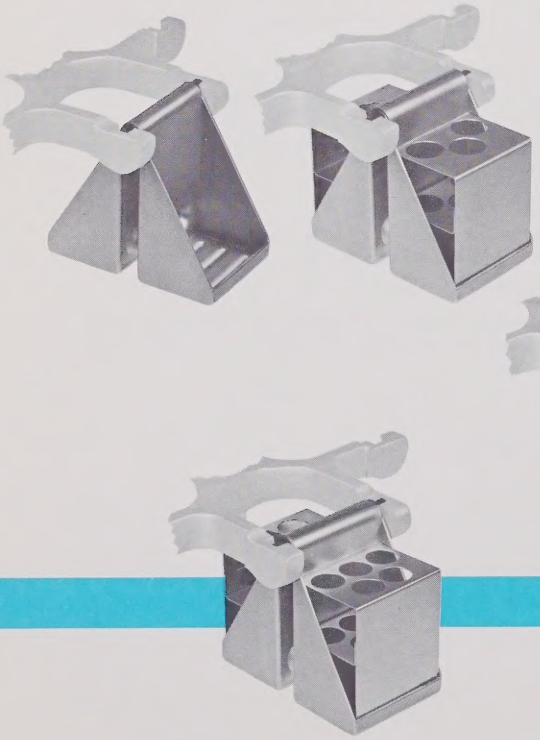
Angle Rotors of stainless steel construction which accept numerous tubes and adapters are available for use in the GLC-1. The new HL-4 Horizontal Rotor, further expands the usefulness of this centrifuge. These rotors meet almost any type of routine requirements and centrifuge versatility is economically expanded.

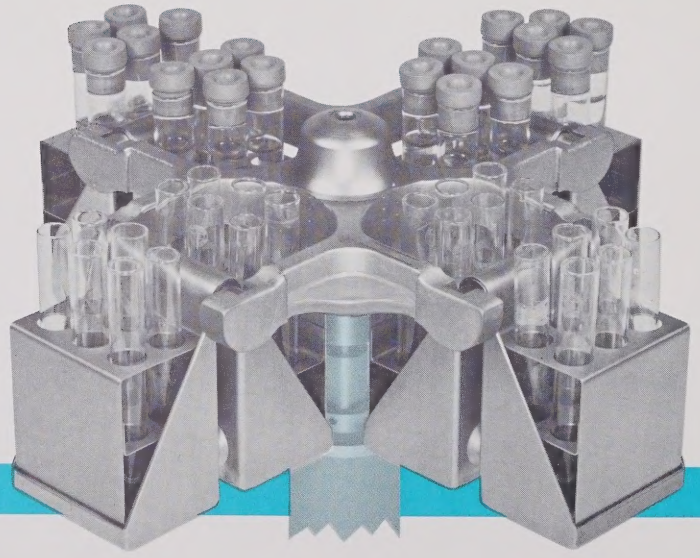
Angle Rotors can be accelerated to 6,000 rpm — capacities range to 575 ml. Literally hundreds of tube and adapter combinations are possible.

The new HL-4 Horizontal Rotor accepts four 100 ml. buckets for tubes up to 44 x 150 mm or eight 50 ml. buckets for tubes up to 28 x 130 mm. Further, the new Omni-Carrier, with inserts, gives the operator the most functional and versatile means for horizontally centrifuging large numbers of tubes simultaneously. A variety of carrier inserts are available accepting 6, 10, 12, and 20 tubes respectively; other capacity inserts are under development. Both the Omni-Carrier and inserts are autoclavable stainless steel. The design permits immersion in a temperature-regulating bath with maximum exposure of tubes.

See rotor specifications on page 7 for individual capacities, g-forces, etc.







Prices and ordering specifications for items here illustrated (and others not shown) are found in a separate GLC-1 Price List.

SORVALL® GLC-1
GENERAL LABORATORY CENTRIFUGE

GLC-1 **SORVALL GENERAL LABORATORY CENTRIFUGE,** basic unit, exclusive of rotors, maximum speed 6,000 RPM.

HOUSING: Cast Aluminum-Alloy Base, with removable Steel Safety Guard and Cover, baked-on epoxy enamel finish.

CONTROL PANEL: Integral in base casting, angled for visibility with illuminated Main Power Switch, SORVALL Electronic Speed Control, Direct Reading Electric Tachometer, 30 minute Timer with "hold" provision, illuminated Dynamic Brake Switch with "flash signal", Circuit Breaker for main circuitry; Fuse for Speed Control.

CENTRIFUGE DRIVE SYSTEM: Specially designed heavy-duty motor, patented SORVALL-Blum "Gyro-Action" Self-Centering Drive, SORVALL Electronic Speed Control for rapid acceleration, automatic Dynamic Braking.

ELECTRICAL REQUIREMENTS: Equipped with 6′ 3-wire Cord and 3-prong Cap with ground connection to fit Hubbell Receptacle No. 5261 or equivalent (115 volts); Hubbell Receptacle No. 5661 or equivalent (220 volts) for connection to one of the following outlets:

115 Volts, AC, 60 Cycles, Single Phase, 5 amps

*220 Volts, AC, 50 Cycles, Single Phase, 2.5 amps

(Specify voltage when ordering)

GLC **SORVALL GENERAL LABORATORY CENTRIFUGE,** same as GLC-1, but **without** Direct Reading Electric Tachometer:

115 Volts, AC, 60 Cycles, Single Phase, 5 amps

*220 Volts, AC, 50 Cycles, Single Phase, 2.5 amps

(Specify voltage when ordering)

17½" W. x 17" D. x 18" H. Net weight 40 lbs. Shipping weight 55 lbs.

*Usually specified for countries other than the U.S.A. and Canada.

A **SORVALL ANGLE CENTRIFUGE ROTOR,** stainless steel construction, 35° angle, complete with Cover and twelve stainless steel Holders for 20 ml. tubes (6,000 rpm — 4,340 x G)

Outside diameter 9¾". Net weight 5½ lbs. Shipping weight 10 lbs.

XL **SORVALL ANGLE CENTRIFUGE ROTOR,** stainless steel construction, 35° angle, complete with Cover and four stainless steel Holders for 50 ml. tubes and four stainless steel Holders for 20 ml. tubes (6,000 rpm — 4,340 x G)

Outside diameter 9¾". Net weight 5½ lbs. Shipping weight 10 lbs.

M **SORVALL ANGLE CENTRIFUGE ROTOR,** stainless steel construction, 35° angle, complete with Cover and twenty-seven stainless steel Holders for 15 ml. tubes (6,000 rpm — 4,950 x G)

Outside diameter 10½". Net weight 6¼ lbs. Shipping weight 10 lbs.

SP **SORVALL ANGLE CENTRIFUGE ROTOR,** stainless steel construction, 35° angle, complete with Cover and six stainless steel Holders for 80 ml. tubes (6,000 rpm — 4,740 x G)

Outside diameter 10½". Net weight 6¼ lbs. Shipping weight 10 lbs.

SP/X **SORVALL ANGLE CENTRIFUGE ROTOR,** stainless steel construction, 35° angle, complete with Cover and ten stainless steel Holders for 50 ml. tubes and five stainless steel Holders for 15 ml. tubes (6,000 rpm — 4,950 x G)

Outside diameter 10½". Net weight 6¼ lbs. Shipping weight 10 lbs.

HL-4 **SORVALL HORIZONTAL ROTOR,** 4-place — Accepts 100 ml. Buckets, 50 ml. Buckets, and the stainless steel Omni-Carrier with all stainless steel inserts. Maximum capacity — 480 ml.

For complete details on various tubes and adapters, limiting speeds, RCF's, etc., and on other rotor accessories, see separate rotor bulletins.

GLC-1 Price List available for items described above, along with rotor accessories.

OTHER SORVALL® LABORATORY INSTRUMENTS

SS-1 and SS-1A Superspeed Angle Centrifuges
SS-3 Automatic Superspeed Centrifuge
SS-4 Manual Superspeed Centrifuge
RC2-B Automatic Superspeed Refrigerated Centrifuge
RC-3 General Purpose Automatic Refrigerated Centrifuge
Small and Medium Angle Centrifuges
Rotors: Angle, Horizontal and Special Purpose
KSB "Szent-Gyorgyi & Blum" Continuous Flow Systems
Accessories including Centrifuge Tubes and Adapters
TC-2 "Smith & Farquhar" Tissue Sectioner
MT-1 "Porter-Blum" Ultra-Microtome
MT-2 "Porter-Blum" Ultra-Microtome
Omni-Mixer Macro-Micro Homogenizer
RF-1 Ribi Refrigerated Cell Fractionator
Automatic Pipettes

Write us for our PRODUCT GUIDE of all SORVALL Centrifuges and Laboratory Instruments. It includes descriptive copy and illustrations. Separate Price List/Ordering Specifications available.

IVAN SORVALL INC.
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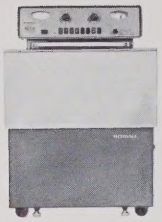
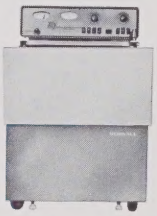


RC2-B AUTOMATIC SUPERSPEED REFRIGERATED CENTRIFUGE — The most efficient Refrigerated Superspeed in its range. Angle and Horizontal Rotors. RCF's to 49,500 x G—Speeds to 20,000 rpm with 24 x 15 ml SM-24 rotor.

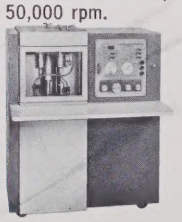


RC-3 GENERAL-PURPOSE AUTOMATIC REFRIGERATED CENTRIFUGE — Speeds processing times. Angle and Horizontal Rotors. Max. 5,000 rpm — 6,975 x G. Automatic programming.

SS-3 AUTOMATIC SUPERSPEED CENTRIFUGE — Compact Superspeed with refined controls. 17,000 rpm — 34,800 x G with standard 8 x 50 ml SS-34 Rotor

MT-2 "PORTER-BLUM" ULTRA-MICROTOME — Dial-controlled sectioning from 100 Å to 4 μ.

OMNI-MIXER MACRO-MICRO HOMOGENIZER—Processes volumes from 0.5 to 2,000 ml. Micro Attachment for processing 0.5 to 5.0 ml at speeds up to 50,000 rpm.



RF-1 RIBI REFRIGERATED CELL FRACTIONATOR — For isolating cell walls and sub-cellular particles of cytoplasm, such as microsomes, enzymes, and nucleic acids. Pressures up to 60,000 psi with 1.5" dia. cell.

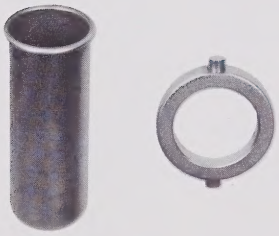
Printed in U.S.

SORVALL®
ROTOR BULLETIN

HL-4

- Designed for the SORVALL GLC and GLC-1 Centrifuges
- Basic Rotor accepts variety of Holders
- 4 x 100 ml Stainless Steel Buckets
- 8 x 50 ml Stainless Steel Buckets
- 4 x OMNI-CARRIERS for Multi-Place Inserts
- Up to 2072 x G (50 ml Bucket)
- Up to 480 ml capacity (Omni-Carrier with Inserts)
- Reducing Adapters for smaller Tubes

HL-4 Horizontal Rotor



Catalog No. 538 STAINLESS STEEL BUCKET, 100 ml capacity for Tubes up to 44 x 150 mm with Catalog No. 537 TRUNNION RING

TUBES				COVERS		ADAPTERS REQUIRED			Recommended Limiting Speeds*
Nominal Capacity (ml)	Material	Outside Dimensions (mm)	Catalog No.	Material	Catalog No.	Material	Color-Coded	Catalog No.	
12	P	17.5 x 120 (T)	104	—	—	SS	—	572[1]	2,600
14	P	17.5 x 120	103A	R	321	SS	—	572[1]	2,600
15	PP	16 x 120 (T)	255	PP	265	SS SS	— —	572[1] 573[2]	2,600
15	PC	16 x 120 (T)	275	PP	265	SS SS	— —	572[1] 573[2]	2,600
20	P	17.5 x 120	103	—	—	SS	—	572[1]	2,600
70	P	44 x 122	112A	—	—	R	Gray	343 Pad	2,600
90	P	44 x 135	113	R	305	R	Gray	343 Pad	2,600
100	P	44 x 138	116	Plastic	Supplied	R	Gray	343 Pad	2,600

1. Two Place Adapter 2. Three Place Adapter * Speeds listed represent upper limits of new tubes; previously used tubes should be derated

KEY TO MATERIALS

PE = Polyethylene
PP = Autoclavable Polypropylene
PC = Autoclavable Polycarbonate
SS = Stainless Steel

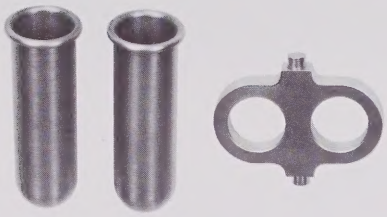
P = Pyrex
C = Corex
N = Autoclavable Nylon
R = Rubber

D = Delrin
T = Tapered
G = Graduated
TW = Thin Wall

Tube and bottle capacities are given as "Nominal" because they may vary with different operating techniques.

HL-4

SORVALL®
ROTOR BULLETIN



Catalog No. 539 STAINLESS STEEL BUCKET, 50 ml capacity for Tubes up to 28 x 130 mm with Catalog No. 540 TRUNNION RING, 2 place

TUBES				COVERS		ADAPTERS REQUIRED			Recommended Limiting Speed*
Nominal Capacity (ml)	Material	Outside Dimensions (mm)	Catalog No.	Material	Catalog No.	Material	Color-Code	Catalog No.	
1	P	8.5 x 63 (T)	120	—	—	R	Gray	317+	3,200
3	P	10 x 75	100	—	—	R	Green	316+	3,200
3.5	PP	12 x 75	250	PP	260	R	Green	316+	3,200
3.5	PC	12 x 75	270	PP	260	R	Green	316+	3,200
5	P	12 x 75	124	—	—	R	Gray	332 in 302	3,200
6.5	PP	13 x 100	251	PP	261	D	Red	402A	3,200
6.5	PC	13 x 100	271	PP	261	D	Red	402A	3,200
10	TW-PP	13 x 98	291	—	—	D	Red	402A	3,200
10	P	13 x 100	101	—	—	R	Red	319	3,200
10	P	17.5 x 102 (T)	123	—	—	R	Blue	328	3,200
10	P	17.5 x 102 (T) (G)	125	—	—	R	Blue	328	3,200
12	P	17.5 x 120 (T)	104	—	—	R	Gray	302	3,200
12	P	18 x 102	102A	R	321	R	Gray	302	3,200
12	PP	16 x 100	252	PP	262	D	Gray	402	3,200
12	PC	16 x 100	272	PP	262	D	Gray	402	3,200
14	P	17.5 x 120	103A	R	321	R	Gray	302	3,200
15	PP	16 x 120 (T)	255	PP	265	R	Gray	302	3,200
15	PC	16 x 120 (T)	275	PP	265	R	Gray	302	3,200
15	TW-PP	16 x 98	292	—	—	D	Gray	402	3,200
15	C	18 x 102	152	—	—	R	Gray	302	3,200
16	PP	18 x 100	257	PP	267	R	Gray	302	3,200
18	PP	19 x 115	253	PP	263	R	Gray	302	3,200
18	PC	19 x 115	273	PP	263	R	Gray	302	3,200
20	P	17.5 x 120	103	—	—	R	Gray	302	3,200
30	P	28 x 96	108S	R	331	R	Gray	330 Pad	3,200
30	C	23 x 102	156	—	—	R	Gray	336	3,200
32	N	29 x 100	221	N	Supplied	—	—	—	3,200
50	P	28 x 101	105	—	—	R	Gray	330 Pad	3,200
50	PP	29 x 105	254	PP	264	—	—	—	3,200
50	PE	29 x 105	256	PP	264	—	—	—	3,200
50	PC	29 x 105	274	PP	264	—	—	—	3,200
50	TW-PP	28 x 104	294	—	—	—	—	—	3,200
50	P	28 x 125	108L	R	304 or 331	R	Gray	330 Pad	3,200
55	P	28 x 120	106	—	—	R	Gray	330 Pad	3,200

+ 2 hole adapter

* Speeds listed represent upper limits of new tubes; previously used tubes should be derated

KEY TO MATERIALS

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Tube and bottle capacities are given as "Nominal" because they may vary with different operating techniques.

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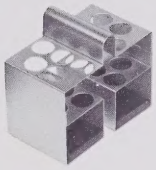
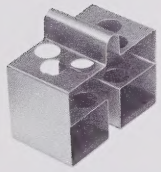


Catalog No. 563 STAINLESS STEEL INSERT, 10 place, for tubes from 10 x 75 mm to 16 x 100 mm

TUBES				COVERS		
Nominal Capacity (ml)	Material	Outside Dimensions (mm)	Catalog No.	Material	Catalog No.	Recommended Limiting Speed*
3.0	P	10 x 75	100	—	—	2,600
3.5	PP	12 x 75	250	PP	260	2,600
3.5	PC	12 x 75	270	PP	260	2,600
5.0	P	12 x 75	124	—	—	2,600
6.5	PP	13 x 100	251	PP	261	2,600
6.5	PC	13 x 100	271	PP	261	2,600
10.0	P	13 x 100	101	—	—	2,600
12.0	PP	16 x 100	252	PP	262	2,600
12.0	PC	16 x 100	272	PP	262	2,600

Catalog No. 564 STAINLESS STEEL INSERT, 12 place, for tubes from 10 x 75 mm to 13 x 100 mm

3.0	P	10 x 75	100	—	—	2,600
3.5	PP	12 x 75	250	PP	260	2,600
3.5	PC	12 x 75	270	PP	260	2,600
5.0	P	12 x 75	124	—	—	2,600
6.5	PP	13 x 100	251	PP	261	2,600
6.5	PC	13 x 100	271	PP	261	2,600
10.0	P	13 x 100	101	—	—	2,600



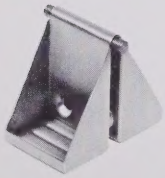
Catalog No. 565 STAINLESS STEEL INSERT, 6 place, for tubes from 13 x 100 mm to 18 x 120 mm

6.5	PP	13 x 100	251	PP	261	2,600
6.5	PC	13 x 100	271	PP	261	2,600
10.0	P	13 x 100	101	—	—	2,600
10.0	P	17.5 x 102 (T)	123	—	—	2,600
10.0	P	17.5 x 102 (T) (G)	125	—	—	2,600
12.0	PP	16 x 100	252	PP	262	2,600
12.0	PC	16 x 100	272	PP	262	2,600
12.0	P	18 x 102	102A	R	321	2,600
12.0	P	17.5 x 120 (T)	104	—	—	2,600
14.0	P	17.5 x 120	103A	R	321	2,600
15.0	PP	16 x 120 (T)	255	PP	265	2,600
15.0	PC	16 x 120 (T)	275	PP	265	2,600
15.0	C	18 x 102	152	—	—	2,600
16.0	PP	18 x 100	257	PP	267	2,600
20.0	P	17.5 x 120	103	—	—	2,600

Catalog No. 575 STAINLESS STEEL INSERT, 20 place, for tubes from 10 x 75 mm to 12 x 75 mm

3.0	P	10 x 75	100	—	—	2,600
3.5	PP	12 x 75	250	PP	260	2,600
3.5	PC	12 x 75	270	PP	260	2,600
5.0	P	12 x 75	124	—	—	2,600

* Speeds listed represent upper limits of new tubes; previously used tubes should be derated

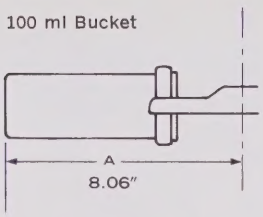


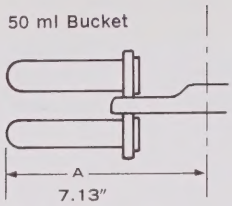
Catalog No. 548
OMNI-CARRIER
for Multiplace
Stainless Steel
Inserts

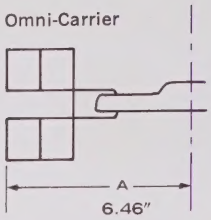
In accord with SORVALL's program of continuing design, stainless steel carriers, other than those listed, are under development. Information on these will be announced when available. Further, for special applications, BLANK INSERTS, without holes, are available.

Tubes listed are SORVALL stock; other tubes may be used providing they are of equal strength and dimensions.

HL-4 SORVALL® ROTOR BULLETIN







RCF CHART

RPM	RCF AT			
	Distance A 8.06″ 100 ml Bucket	Distance A 7.13″ 50 ml Bucket	Distance A 6.46″ Omni-Carrier	Reference 1″ Radius
500	57	51	46	7
1000	229	202	183	28
1500	515	455	413	64
2000	915	809	733	114
2500	1430	1265	1146	177
2600	1545†	—	1239†	191
3000	—	1821	—	255
3200	—	2072‡	—	290

† Maximum Speed for 100 ml Bucket and Omni-Carrier

‡ Maximum Speed for 50 ml Buckets

THE GLC-1 GENERAL LABORATORY CENTRIFUGE, for which the HL-4 Rotor was designed, will also accept the Small and Medium Rotors. Refer to separate Rotor Bulletin describing these Rotors.

To find RCF (Relative Centrifugal Force) for any other points, multiply desired radius (in inches) by the Reference 1″ Radius Values.

A

XL

M

SP

SP/X

Separate Data Bulletin on the chemical and physical properties of plastic tubes will be sent upon request. For prices on tubes, adapters, and accessories for SORVALL centrifuge rotors, refer to current price list.

IVAN SORVALL INC.
NORWALK • CONNECTICUT • 06852

HL-4-RB-(K)J-8/67

Printed in U.S.A.

SORVALL®
ROTOR BULLETIN

SMALL AND MEDIUM ANGLE CENTRIFUGE ROTORS

- 5 Interchangeable Stainless Steel Rotors
- 35° Angle
- Capacity up to 575 ml
- RCF's up to 4,600 x G
- Reducing Adapters for wide variety of Tubes
- Adaptable to GLC, GLC-1 Centrifuges (M and SP/X also adaptable to RC-3 Centrifuge)

TYPE A, 12 Places for 20 ml Tubes

TUBES				COVERS		ADAPTERS REQUIRED			Recommended Limiting Speed*
Nominal Capacity (ml)	Material	Outside Dimension (mm)	Catalog No.	Material	Catalog No.	Material	Color-Code	Catalog No.	
1	P	8.5 x 63 (T)	120	—	—	R	Gray	318	6,000
3	P	10 x 75	100	—	—	R	Gray	315	6,000
3.5	PP	12 x 75	250	PP	260	R	Gray	315	6,000
3.5	PC	12 x 75	270	PP	260	R	Gray	315	6,000
6.5	PP	13 x 100	251	PP	261	R	Red	311	6,000
6.5	PC	13 x 100	271	PP	261	R	Red	311	6,000
10.0	TW-PP	13 x 100	291	—	—	R	Red	311	6,000
10.0	P	13 x 100	101	—	—	R	Red	311	6,000
12.0	P	17.5 x 120 (T)	104	—	—	—	—	—	6,000
14.0	P	17.5 x 120	103A	R	321	—	—	—	6,000
15.0	PP	16 x 120 (T)	255	PP	265	—	—	—	6,000
15.0	PC	16 x 120 (T)	275	PP	265	—	—	—	6,000
20.0	P	17.5 x 120	103	—	—	—	—	—	6,000
20.0	SS	18 x 118	502	—	—	—	—	—	6,000

TYPE XL, 4 Places for 50 ml Tubes; 4 Places for 20 ml Tubes

TUBES				COVERS		ADAPTERS REQUIRED			Recommended Limiting Speed*
Nominal Capacity (ml)	Material	Outside Dimension (mm)	Catalog No.	Material	Catalog No.	Material	Color-Code	Catalog No.	
1.0	P	8.5 x 63 (T)	120	—	—	R R	Gray Gray[3]	318 317	6,000
3.0	P	10 x 75	100	—	—	R R	Green Green[3]	315 316	6,000
3.5	PP	12 x 75	250	PP	260	R R	Green Green[3]	315 316	6,000
3.5	PC	12 x 75	270	PP	260	R R	Green Green[3]	315 316	6,000
5.0	P	12 x 75	124	—	—	R R	Gray Gray	332 332 in 302	6,000
6.5	PP	13 x 100	251	PP	261	R R or SS	Red Red or SS	311 319 or 509L	6,000
6.5	PC	13 x 100	271	PP	261	R R or SS	Red Red or SS	311 319 or 509L	6,000
10.0	P	13 x 100	101	—	—	R R or SS	Red Red or SS	311 319 or 509L	6,000
10.0	TW-PP	13 x 100	291	—	—	R R or SS	Red Red or SS	311 319 or 509L	6,000
12.0	P	17.5 x 120 (T)	104	—	—	— R	— Gray	— 302	6,000

* Speeds listed represent upper limits of new tubes; previously used tubes should be derated

TYPE XL (cont'd)

KEY TO MATERIALS

PE = Polyethylene
PP = Autoclavable Polypropylene
PC = Autoclavable Polycarbonate
SS = Stainless Steel

P = Pyrex
C = Corex
N = Autoclavable Nylon
R = Rubber

D = Delrin
T = Tapered
G = Graduated
TW = Thin Wall

Tube and bottle capacities are given as "Nominal" because they may vary with different operating techniques.

TYPE XL (cont'd)

TUBES				COVERS		ADAPTERS REQUIRED			Recommended Limiting Speed*
Nominal Capacity (ml)	Material	Outside Dimension (mm)	Catalog No.	Material	Catalog No.	Material	Color-Code	Catalog No.	
14.0	P	17.5 x 120	103A	R	321	— R	— Gray	— 302	6,000
15.0	PP	16 x 120 (T)	255	PP	265	— R	— Gray	— 302	6,000
15.0	PC	16 x 120 (T)	275	PP	265	— R	— Gray	— 302	6,000
15.0	C	18 x 102	152	—	—	Not Applicable R	Gray	302	6,000
16.0	PP	18 x 100	257	PP	267	Not Applicable R	Gray	302	6,000
18.0	PP	19 x 115	253	PP	263	Not Applicable R	Gray	302	6,000
18.0	PC	19 x 115	273	PP	263	Not Applicable R	Gray	302	6,000
20.0	P	17.5 x 120	103	—	—	— R	— Gray	— 303	6,000
50.0	P	28 x 125	108L	R	304 or 331	Not Applicable —	—	—	5,000
55.0	P	28 x 120	106	—	—	Not Applicable —	—	—	6,000
20.0	SS	18 x 118	502[1]	—	—	— Not Applicable	—	—	6,000
50.0	SS	32 x 114	504[2]	—	—	Not Applicable —	—	—	6,000

1. Small Holder: Accepts Tubes and Adapters Indicated
2. Large Holder: Accepts Tubes and Adapters Indicated
3. 2 Hole Adapter

TYPE M, 27 Places for 15 ml Tubes

TUBES				COVERS		ADAPTERS REQUIRED			Recommended Limiting Speed*
Nominal Capacity (ml)	Material	Outside Dimension (mm)	Catalog No.	Material	Catalog No.	Material	Color-Code	Catalog No.	
1	P	8.5 x 63 (T)	120	—	—	R	Gray	318	6,000
3	P	10 x 75	100	—	—	R	Green	314	6,000
3.5	PP	12 x 75	250	PP	260	R	Green	314	6,000
3.5	PC	12 x 75	270	PP	260	R	Green	314	6,000
5	P	12 x 75	124	—	—	R	Gray	332	6,000
6.5	PP	13 x 100	251	PP	261	D	Red	416	6,000
6.5	PC	13 x 100	271	PP	261	D	Red	416	6,000
10.0	TW-PP	13 x 100	291	—	—	D	Red	416	6,000
10.0	P	13 x 100	101	—	—	R	Red	310	6,000
12.0	P	17.5 x 102	102B	R	321	—	—	—	6,000
12.0	PP	16 x 100	252	PP	262	—	—	—	6,000
12.0	PC	16 x 100	272	PP	262	—	—	—	6,000
15.0	P	17.5 x 100	102	—	—	—	—	—	4,500
15.0	TW-PP	16 x 100	292	—	—	—	—	—	6,000
15.0	C	18 x 102	152	—	—	—	—	—	6,000
16.0	PP	18 x 100	257	PP	267	—	—	—	6,000
15.0	SS	18 x 92	501	—	—	—	—	—	6,000

* Speeds listed represent upper limits of new tubes; previously used tubes should be derated

TYPE SP, 6 Places for 80 ml Tubes

TUBES				COVERS		ADAPTERS REQUIRED			Recommended Limiting Speed*
Nominal Capacity (ml)	Material	Outside Dimension (mm)	Catalog No.	Material	Catalog No.	Material	Color-Code	Catalog No.	
3.0	P	10 x 75	100	—	—	R	Gray	315 in 303	6,000
3.5	PP	12 x 75	250	PP	260	R	Gray	315 in 303	6,000

TYPE SP (cont'd)

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TYPE SP (cont'd)

TUBES				COVERS		ADAPTERS REQUIRED			Recommended Limiting Speed*
Nominal Capacity (ml)	Material	Outside Dimension (mm)	Catalog No.	Material	Catalog No.	Material	Color-Code	Catalog No.	
3.5	PC	12 x 75	270	PP	260	R	Gray	315 in 303	6,000
6.5	PP	13 x 100	251	PP	261	SS	—	509L	6,000
6.5	PC	13 x 100	271	PP	261	SS	—	509L	6,000
10.0	P	13 x 100	101	—	—	R SS	Gray —	311 in 303 509L	6,000
10.0	TW-PP	13 x 100	291	—	—	SS	—	509L	6,000
12.0	P	17.5 x 120 (T)	104	—	—	R	Gray	303	6,000
14.0	P	17.5 x 120	103A	R	321	R	Gray	303	6,000
15.0	PP	16 x 120 (T)	255	PP	265	R	Gray	303	6,000
15.0	PC	16 x 120 (T)	275	PP	265	R	Gray	303	6,000
18.0	PP	19 x 115	253	PP	263	R	Gray	303	6,000
18.0	PC	19 x 115	273	PP	263	R	Gray	303	6,000
20.0	P	17.5 x 120	103	—	—	R	Gray	303	6,000
70.0	P	32 x 135	111	R R	304 331	—	—	—	4,500
75.0	P	32 x 130	110	—	—	—	—	—	6,000
80.0	Brass	33 x 127	505	—	—	—	—	—	6,000

TYPE SP/X, 10 Places for 50 ml Tubes; 5 Places for 15 ml Tubes

TUBES				COVERS		ADAPTERS REQUIRED			Recommended Limiting Speed*
Nominal Capacity (ml)	Material	Outside Dimension (mm)	Catalog No.	Material	Catalog No.	Material	Color-Code	Catalog No.	
1.0	P	8.5 x 63 (T)	120	—	—	R R	Gray Gray[3]	318 317	6,000
3.0	P	10 x 75	100	—	—	R R	Green Green[2]	314 316	6,000
3.5	PP	12 x 75	250	PP	260	R R	Green Green[3]	314 316	6,000
3.5	PC	12 x 75	270	PP	260	R R	Green Green[3]	314 316	6,000
5.0	P	12 x 75	124	—	—	R R	Gray Gray	332 332 in 302	6,000
6.5	PP	13 x 100	251	PP	261	R R or SS	Red Red or SS	310 319 or 509S	6,000
6.5	PC	13 x 100	271	PP	261	R R or SS	Red Red or SS	310 319 or 509S	6,000
10.0	P	13 x 100	101	—	—	R R or SS	Red Red or SS	310 319 or 509S	6,000
10.0	P	17.5 x 102 (T)	123	—	—	— R	Not Applicable Blue	— 328	6,000
10.0	TW-PP	13 x 100	291	—	—	R R or SS	Red Red or SS	310 319 or 509S	6,000
12.0	P	17.5 x 102	102B	R	321	— R	— Gray	— 302	6,000
12.0	P	17.5 x 120 (T)	104	—	—	— R	Not Applicable Gray	— 302	6,000
12.0	PP	16 x 100	252	PP	262	— R	— Gray	— 302	6,000
12.0	PC	16 x 100	272	PP	262	— R	— Gray	— 302	6,000
15.0	P	17.5 x 100	102	—	—	— R	— Gray	— 302	4,500 6,000
15.0	TW-PP	16 x 100	292	—	—	— R	— Gray	— 302	6,000
15.0	PP	16 x 120 (T)	255	PP	265	— R	Not Applicable Gray	— 302	6,000
15.0	PC	16 x 120 (T)	275	PP	265	— R	Not Applicable Gray	— 302	6,000
16.0	PP	18 x 100	257	PP	267	— R	— Gray	— 302	6,000
15.0	C	18 x 102	152	—	—	— R	— Gray	— 302	6,000
18.0	PP	19 x 115	253	PP	263	— R	Not Applicable Gray	— 302	6,000
18.0	PC	19 x 115	273	PP	263	— R	Not Applicable Gray	— 302	6,000

Tube and bottle capacities are given as "Nominal" because they may vary with different operating techniques.

* Speeds listed represent upper limits of new tubes; previously used tubes should be derated

TYPE SP/X (cont'd)

KEY TO MATERIALS

PE = Polyethylene
PP = Autoclavable Polypropylene
PC = Autoclavable Polycarbonate
SS = Stainless Steel
P = Pyrex
C = Corex
N = Autoclavable Nylon
R = Rubber
D = Delrin
T = Tapered
G = Graduated
TW = Thin Wall

1. Small Holder: Accepts Tubes and Adapters Indicated
2. Large Holder: Accepts Tubes and Adapters Indicated
3. 2 Hole Adapter

TYPE SP/X (cont'd)

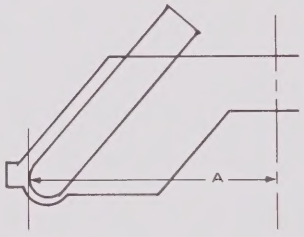
TUBES				COVERS		ADAPTERS REQUIRED			Recommended Limiting Speed*
Nominal Capacity (ml)	Material	Outside Dimension (mm)	Catalog No.	Material	Catalog No.	Material	Color-Code	Catalog No.	
30.0	P	28 x 96	108S	R	304 or 331	Not Applicable			5,500
30.0	C	23 x 102	156	—	—	Not Applicable	Gray	336	6,000
45.0	P	28 x 101	105	—	—	Not Applicable			4,500
50.0	TW-PP	28 x 103	294	—	—	Not Applicable			6,000
50.0	PP	29 x 105	254	PP	264	Not Applicable			6,000
50.0	PE	29 x 105	256	PP	264	Not Applicable			6,000
50.0	PC	29 x 105	274	PP	264	Not Applicable			6,000
15.0	SS	18 x 92	501[1]	—	—	Not Applicable			6,000
50.0	SS	32 x 102	503[2]	—	—	Not Applicable			6,000

(see previous page for KEY TO MATERIALS and footnotes)

320 Adapter: Used in A, XL (use 302 in 504), M, SP/X (use 302 in 503) for use with Wintrobe Hematocrit tube.

RCF CHART

RPM	ROTORS					
	A	XL	M	SP	SP/X	Reference 1″ Radius
500	30	30	34	33	34	7
1000	121	121	138	132	138	28
1500	271	271	310	297	310	64
2000	482	482	551	528	551	114
2500	754	754	860	825	860	177
3000	1086	1086	1239	1188	1239	255
3500	1478	1478	1686	1617	1686	348
4000	1930	1930	2202	2111	2202	454
4500	2442	2442	2787	2672	2787	575
5000	3015	3015	3441	3299	3441	710
5500	3649	3649	4164	3992	4164	860
6000	4342	4342	4955	4751	4955	1020



A A = 4.25
XL A = 4.25 SP A = 4.65
M A = 4.85 SP/X A = 4.85

To find RCF (Relative Centrifugal Force) for any other points, multiply desired radius (in inches) by the Reference 1″ Radius Values.

SPECIFICATIONS AND ACCESSORIES

Catalog No.	Description
A	SORVALL ANGLE CENTRIFUGE ROTOR, stainless steel construction, 35° angle, complete with Cover and twelve stainless steel Holders for 20 ml tubes Outside Diameter, 9¾″. Net Weight, 5½ lbs. Shipping Weight, 10 lbs.
XL	SORVALL ANGLE CENTRIFUGE ROTOR, stainless steel construction, 35° angle, complete with Cover and four stainless steel Holders for 50 ml tubes and four stainless steel Holders for 20 ml tubes Outside Diameter, 9¾″. Net Weight, 5½ lbs. Shipping Weight, 10 lbs.
M	SORVALL ANGLE CENTRIFUGE ROTOR, stainless steel construction, 35° angle, complete with Cover and twenty-seven stainless steel Holders for 15 ml tubes Outside Diameter, 10½″. Net Weight, 6¼ lbs. Shipping Weight, 10 lbs.
SP	SORVALL ANGLE CENTRIFUGE ROTOR, stainless steel construction, 35° angle, complete with Cover and six stainless steel Holders for 80 ml tubes Outside Diameter, 10½″. Net Weight, 6¼ lbs. Shipping Weight, 10 lbs.
SP/X	SORVALL ANGLE CENTRIFUGE ROTOR, stainless steel construction, 35° angle, complete with Cover and ten stainless steel Holders for 50 ml tubes and five stainless steel Holders for 15 ml tubes Outside Diameter, 10½″. Net Weight, 6¼ lbs. Shipping Weight, 10 lbs.
1015	TWISTED WIRE BRUSH, with Nickel-Silver and Nylon Bristles for cleaning large Holders of XL, SP and SP/X Rotors
1037	TWISTED WIRE BRUSH, with Nickel-Silver and Nylon Bristles for cleaning small Holders of A, XL, M and SP/X Rotors

Separate Data Bulletin on the chemical and physical properties of plastic tubes will be sent upon request.

For prices on tubes, adapters, and accessories for SORVALL centrifuge rotors, refer to current price list.

IVAN SORVALL INC.
NORWALK • CONNECTICUT • 06852

S/M-RB-(AD)J-8/67

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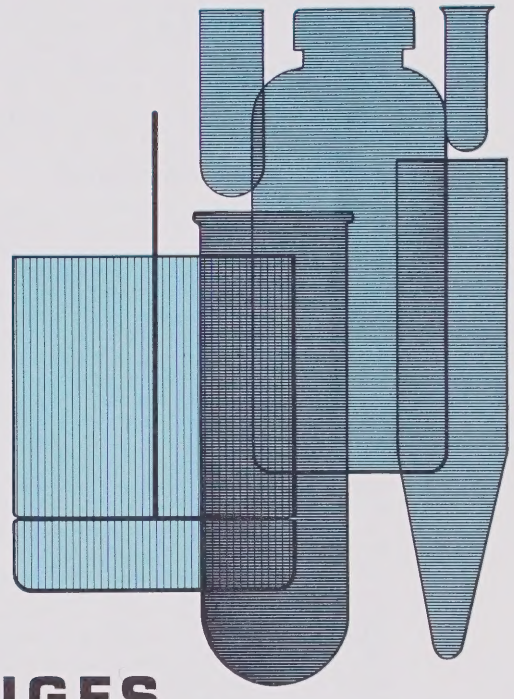
SORVALL® BULLETIN

TUBES • BOTTLES
ADAPTERS
ACCESSORIES

SPECIFICATIONS AND PRICE LIST

TUBES, BOTTLES, ADAPTERS & ACCESSORIES FOR SORVALL® LABORATORY CENTRIFUGES



EFFECTIVE JANUARY 1, 1967

GENERAL TERMS

- Minimum Order Value $5.00
- Terms: Net 30 Days
- All Prices F.O.B. Assembly Plant, Newtown, Connecticut
- Prices and Specifications Subject to Change Without Notice

IVAN SORVALL INC.
NORWALK • CONNECTICUT • 06852

GLASS TUBES AND BOTTLES

CAT. NO.	DESCRIPTION		PRICE
100	PYREX tube, 3 ml., 10 x 75 mm.	doz.	$ .52
101	PYREX tube, 10 ml., 13 x 100 mm.	doz.	.56
102	PYREX tube, 15 ml., 17.5 x 100 mm.	doz.	5.40
102A	PYREX tube, 12 ml., 18 x 102 mm., heavy wall (use 321 cover)	doz.	4.80
102B	PYREX tube, 12 ml., 17.5 x 102 mm., heavy wall (use 321 cover)	doz.	6.00
103	PYREX tube, 20 ml., 17.5 x 120 mm.	doz.	6.60
103A	PYREX tube, 14 ml., 17.5 x 120 mm., heavy wall (use 321 cover)	doz.	7.20
104	PYREX tube, 12 ml., 17.5 x 120 mm., heavy wall, tapered	doz.	7.20
105	PYREX tube, 45 ml., 28 x 101 mm.	doz.	7.80
106	PYREX tube, 55 ml., 28 x 120 mm.	doz.	9.00
108L	PYREX tube, 50 ml., 28 x 125 mm., constricted neck (use 304 or 331 cover)	doz.	10.20
108S	PYREX tube, 30 ml., 28 x 96 mm., constricted neck (use 304 or 331 cover)	doz.	9.60
110	PYREX tube, 75 ml., 32 x 130 mm.	ea.	1.10
111	PYREX tube, 70 ml., 32 x 135 mm., constricted neck (use 304 or 331 cover)	ea.	1.20
112A	PYREX tube, 70 ml., 44 x 122 mm.	ea.	2.50
113	PYREX tube, 90 ml., 44 x 135 mm., constricted neck (use 305 cover)	ea.	2.50
116	PYREX tube, 100 ml., 44 x 138 mm., heavy wall, with plastic screw cover	ea.	3.75
117	PYREX bottle, 130 ml., 53 x 132 mm., round bottom, heavy wall, with plastic screw cover	ea.	7.50
118	PYREX tube, 5 ml., 14 x 60 mm. (use 326 cover)	doz.	3.60
120	PYREX tube, 1 ml., 8.5 x 63 mm., tapered	doz.	4.08
121	PYREX tube, 6 ml., 18 x 52 mm., heavy wall (use 321 cover)	doz.	8.40
122	PYREX tube, 4 ml., 14 x 52 mm., (use 326 cover)	doz.	3.60
123	PYREX tube, 10 ml., 17.5 x 102 mm., heavy wall, tapered	doz.	6.60
124	PYREX tube, 5 ml., 12 x 75 mm.	doz.	.52
125	PYREX tube, 10 ml., 17.5 x 102 mm., heavy wall, tapered, graduated	doz.	24.00
152	COREX tube, 15 ml., 18 x 102 mm.	doz.	6.60
156	COREX tube, 30 ml., 23 x 102 mm.	doz.	10.20
158	COREX bottle, 150 ml., 53 x 132 mm., with plastic screw cover	ea.	9.00

PLASTIC TUBES AND COVERS

221	AUTOCLAVABLE NYLON tube, 32 ml., 29 x 100 mm., with nylon cover	ea.	7.50
240	AUTOCLAVABLE POLYPROPYLENE tube, 14 ml., 18 x 75 mm. (use 267 cover)	doz.	3.00
250	AUTOCLAVABLE POLYPROPYLENE tube, 3.5 ml., 12 x 75 mm. (use 260 cover)	doz.	1.80
251	AUTOCLAVABLE POLYPROPYLENE tube, 6.5 ml., 13 x 100 mm. (use 261 cover)	doz.	1.92
252	AUTOCLAVABLE POLYPROPYLENE tube, 12 ml., 16 x 100 mm. (use 262 cover)	doz.	2.04
253	AUTOCLAVABLE POLYPROPYLENE tube, 18 ml., 19 x 115 mm. (use 263 cover)	doz.	2.52
254	AUTOCLAVABLE POLYPROPYLENE tube, 50 ml., 29 x 105 mm. (use 264 cover)	doz.	2.64
255	AUTOCLAVABLE POLYPROPYLENE tube, 15 ml., 16 x 120 mm., tapered (use 265 cover)	doz.	3.00
256	POLYETHYLENE tube, 50 ml., 29 x 105 mm. (use 264 cover)	doz.	3.60
257	AUTOCLAVABLE POLYPROPYLENE tube, 16 ml., 18 x 100 mm. (use 267 cover)	doz.	3.60
258	POLYETHYLENE bottle, 250 ml., 60 x 137 mm., narrow mouth with screw cover	doz.	3.80
259	AUTOCLAVABLE POLYPROPYLENE bottle, 250 ml., 60 x 122 mm., wide mouth with screw cover	doz.	9.60
260	POLYPROPYLENE cover for Nos. 250 and 270 tubes	doz.	1.20
261	POLYPROPYLENE cover for Nos. 251 and 271 tubes	doz.	1.35
262	POLYPROPYLENE cover for Nos. 252 and 272 tubes	doz.	1.50
263	POLYPROPYLENE cover for Nos. 253 and 273 tubes	doz.	1.65
264	POLYPROPYLENE cover for Nos. 254, 256 and 274 tubes	doz.	2.00
265	POLYPROPYLENE cover for Nos. 255 and 275 tubes	doz.	1.50
267	POLYPROPYLENE cover for Nos. 240, 257 and 277 tubes	doz.	1.75
269	POLYETHYLENE bottle, 250 ml., 60 x 122 mm., wide mouth with screw cover	doz.	4.50
270	AUTOCLAVABLE POLYCARBONATE tube, 3.5 ml., 12 x 75 mm. (use 260 cover)	doz.	2.64
271	AUTOCLAVABLE POLYCARBONATE tube, 6.5 ml., 13 x 100 mm. (use 261 cover)	doz.	2.76
272	AUTOCLAVABLE POLYCARBONATE tube, 12 ml., 16 x 100 mm. (use 262 cover)	doz.	3.00
273	AUTOCLAVABLE POLYCARBONATE tube, 18 ml., 19 x 115 mm. (use 263 cover)	doz.	3.96
274	AUTOCLAVABLE POLYCARBONATE tube, 50 ml., 28 x 102 mm. (use 264 cover)	doz.	4.20
275	AUTOCLAVABLE POLYCARBONATE tube, 15 ml., 16 x 120 mm., tapered (use 265 cover)	doz.	4.20
277	AUTOCLAVABLE POLYCARBONATE tube, 14 ml., 18 x 75 mm. (use 267 cover)	doz.	3.25
278	AUTOCLAVABLE POLYCARBONATE bottle, 250 ml., 61 x 136 mm., round bottom, wide mouth with plastic screw cover	ea.	1.65
279	AUTOCLAVABLE POLYCARBONATE bottle, 290 ml., 61 x 138 mm., flat bottom, wide mouth with plastic screw cover	ea.	1.25
280	AUTOCLAVABLE POLYCARBONATE bottle, 650 ml., 86 x 166 mm., with plastic screw cover	ea.	2.50
282	AUTOCLAVABLE POLYPROPYLENE bottle, 500 ml., 74 x 175 mm., with plastic screw cover	ea.	1.50
283	AUTOCLAVABLE POLYCARBONATE bottle, 500 ml., 74 x 175 mm., with plastic screw cover	ea.	2.25
291	POLYPROPYLENE tube, thin-wall, 10 ml., 13 x 98 mm.	doz.	2.16
292	POLYPROPYLENE tube, thin-wall, 15 ml., 16 x 98 mm.	doz.	2.40
294	POLYPROPYLENE tube, thin-wall, 50 ml., 28 x 104 mm.	doz.	2.40

RUBBER ADAPTERS, COVERS AND PADS

302	RUBBER adapter, color-coded Gray for Nos. 102, 102A, 102B, 104, 152, 252, 253, 255, 257, 272, 273, 275 and 277 tubes	ea.	1.60
303	RUBBER adapter color-coded Gray for Nos. 103, 103A, 104, 253, 255, 273 and 275 tubes	ea.	1.85
304	RUBBER cover for Nos. 108L, 108S and 111 tubes	doz.	.50
305	RUBBER cover for No. 113 tube	doz.	2.25
307	NEOPRENE "O" Ring for Nos. 529 and 529C Stainless Steel covers	doz.	3.60
308	NEOPRENE washer for Nos. 518 and 518C covers	doz.	1.80
309	RUBBER pad, concave, for Nos. 509S and 509L adapters	doz.	1.50
310	RUBBER adapter, color-coded Red for Nos. 101, 251, 271 and 291 tubes	ea.	1.15
311	RUBBER adapter, color-coded Red for Nos. 101, 251, 271 and 291 tubes	ea.	1.25
314	RUBBER adapter, color-coded Green for Nos. 100, 250 and 270 tubes	ea.	1.25
315	RUBBER adapter, color-coded Green for Nos. 100, 250 and 270 tubes	ea.	1.35
316	RUBBER adapter, color-coded Green, 2-hole, for Nos. 100, 250 and 270 tubes	ea.	1.50
317	RUBBER adapter, color-coded Gray, 2-hole, for No. 120 tube	ea.	1.60
318	RUBBER adapter, color-coded Gray for No. 120 tube	ea.	1.25

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RUBBER ADAPTERS, COVERS AND PADS (continued)

CAT. NO.	DESCRIPTION		PRICE
319	RUBBER adapter, color-coded Red for Nos. 101, 251, 271 and 291 tubes	ea.	1.65
320	RUBBER adapter, color-coded Gray for Wintrobe Hematocrit tube	ea.	1.25
321	RUBBER cover for Nos. 102A, 102B, 103A and 121 tubes	doz.	.30
322	RUBBER pad for No. 443 adapter	ea.	.65
323	RUBBER adapter, color-coded Gray for Nos. 112A, 113 and 116 tubes	ea.	4.00
324	RUBBER pad for No. 121 tube and No. 440 adapter	doz.	3.00
325	RUBBER adapter, color-coded Green for No. 122 tube	ea.	1.15
326	RUBBER cover for Nos. 118 and 122 tubes	doz.	.30
328	RUBBER adapter, color-coded Blue for Nos. 123 and 125 tubes	ea.	1.70
329	RUBBER adapter, color-coded Gray for Nos. 117 and 158 bottles	ea.	4.00
330	RUBBER pad for Nos. 105 and 108S tubes (HB-4 Rotor only)	doz.	2.50
331	RUBBER cover for Nos. 108L, 108S and 111 tubes	doz.	.75
332	RUBBER adapter, color-coded Gray for No. 124 tube	ea.	1.25
335	RUBBER balancing discs for HG-4 and BR-4 (T) Rotors	pkg. of 6	1.15
336	RUBBER adapter, color-coded Gray for No. 156 tube	ea.	1.75
337	RUBBER pad for No. 442 adapter	ea.	.30
338	RUBBER adapter, color-coded Green for No. 100 tube	ea.	1.25
339	RUBBER adapter, color-coded Gray for No. 120 tube	ea.	1.25
340	RUBBER adapter, color-coded Gray for No. 124 tube	ea.	1.25
341	RUBBER adapter, color-coded Green for Nos. 250 and 270 tubes	ea.	1.25
342	RUBBER adapter, color-coded Blue for No. 118 tube	ea.	1.25
343	RUBBER pad for No. 538 bucket	ea.	.40

PLASTIC ADAPTERS, COVERS AND PADS

402	DELRIN adapter, color-coded Gray for Nos. 252, 272 and 292 tubes	ea.	3.75
402A	DELRIN adapter, color-coded Red for Nos. 251, 271 and 291 tubes	ea.	3.75
414	PLASTIC screw cover with inert rubber liner for No. 116 tube and No. 117 bottle	doz.	1.50
416	DELRIN adapter, color-coded Red for Nos. 251, 271 and 291 tubes	ea.	2.75
437	POLYPROPYLENE adapter, color-coded Gray, 5-hole, for Nos. 103, 103A, 104, 255 or 275 tubes (use adapters Nos. 311 and 315 for smaller tubes)	ea.	6.50
439	POLYPROPYLENE pad, color-coded White, concave, for No. 278 bottle	ea.	.90
	Nos. 440 through 445 are for use with HG-4, BR-4, and BR-4T Rotors only		
440	POLYPROPYLENE adapter, color-coded White, 10-hole	ea.	6.50
441	POLYPROPYLENE adapter, color-coded Blue, 4-hole	ea.	6.50
442	POLYPROPYLENE adapter, color-coded Turquoise, 12-hole	ea.	6.50
443	POLYPROPYLENE adapter, color-coded Yellow	ea.	6.50
444	POLYPROPYLENE sleeve, color-coded Brown	ea.	6.00
445	POLYPROPYLENE adapter, color-coded Gray, 16-hole	ea.	6.50

METAL TUBES, HOLDERS, BOTTLES, ADAPTERS AND COVERS

501	STAINLESS STEEL holder, 18 x 92 mm., small size, for SP/X and M	ea.	1.50
502	STAINLESS STEEL holder, 18 x 118 mm., small size, for A and XL	ea.	1.80
503	STAINLESS STEEL holder, 32 x 102 mm., large size, for SP/X	ea.	2.50
504	STAINLESS STEEL holder, 32 x 114 mm., large size, for XL	ea.	2.60
505	BRASS holder, chrome plated, 33 x 127 mm., for SP	ea.	2.80
509L	STAINLESS STEEL adapter, 3-hole, with concave rubber pads, for three Nos. 101, 251, 271 and 291 tubes	ea.	4.50
509S	STAINLESS STEEL adapter, 3-hole, with concave rubber pads, for three Nos. 101, 251, 271 and 291 tubes	ea.	4.50
517F	STAINLESS STEEL tube, 50 ml., 28 x 101 mm., with flange (use 518 cover)	ea.	3.90
517P	STAINLESS STEEL tube, 50 ml., 28 x 101 mm., without flange (use 518 cover)	ea.	3.90
517FC	STAINLESS STEEL tube, 50 ml., 28 x 101 mm., with flange, KEL-F lined (use 518C cover)	ea.	9.75
517PC	STAINLESS STEEL tube, 50 ml., 28 x 101 mm., without flange, KEL-F lined (use 518C cover)	ea.	9.75
518	STAINLESS STEEL cover, expansion type, neoprene washer, for Nos. 517F, 517P, 522, 254, 256 and 274 tubes (use No. 1014 wrench)	ea.	1.50
518C	STAINLESS STEEL cover, expansion type, neoprene washer, lower plate KEL-F coated for Nos. 517FC, 517PC, 522C, 254, 256 and 274 tubes (use No. 1014 wrench)	ea.	2.50
521	STAINLESS STEEL cup, 200 ml., 61 x 124 mm.	ea.	11.00
521C	STAINLESS STEEL cup, 200 ml., 61 x 124 mm., KEL-F lined	ea.	17.00
522	STAINLESS STEEL bottle, 315 ml., 61 x 153 mm. (use 518 cover)	ea.	18.50
522C	STAINLESS STEEL bottle, 315 ml., 61 x 153 mm., KEL-F lined (use 518C cover)	ea.	26.50
525	STAINLESS STEEL tube, 17.5 ml., 18 x 96 mm.	ea.	2.50
526	STAINLESS STEEL tube, 10 ml., 19 x 57 mm.	ea.	1.75
530	STAINLESS STEEL bottle, 285 ml., 61 x 140 mm., wide mouth, complete with No. 529 Stainless Steel cover with Neoprene "O" Ring Seal	ea.	28.00
530C	STAINLESS STEEL bottle, 285 ml., 61 x 140 mm., KEL-F lined, wide mouth, complete with No. 529C Stainless Steel cover with Neoprene "O" Ring Seal	ea.	35.00
531C	STAINLESS STEEL cup, Teflon-lined, for BR-4T Rotor	ea.	50.00
534	STAINLESS STEEL cup, with threaded cover for BR-4 Rotor	ea.	50.00
535	ALUMINUM bucket, Teflon treated for HG-4 Rotor	ea.	30.00
536	STAINLESS STEEL tube, 15 ml., 18 x 75 mm.	ea.	2.00
537	TRUNNION RING for No. 538 bucket	ea.	2.50
538	STAINLESS STEEL bucket, 100 ml., for HL-4 Rotor	ea.	3.45
539	STAINLESS STEEL bucket, 50 ml., for HL-4 Rotor	ea.	3.40
540	TRUNNION RING, 2-place, for No. 539 bucket	ea.	3.50
548	STAINLESS STEEL OMNI-CARRIER for HL-4 Rotor	ea.	12.00
552	ALUMINUM SEALING CAP for No. 259 bottle	ea.	17.50
558	ALUMINUM SEALING CAP for Nos. 282 and 283 bottles	ea.	25.00
563	STAINLESS STEEL insert, 10-place	ea.	5.60
564	STAINLESS STEEL insert, 12-place	ea.	5.60
565	STAINLESS STEEL insert, 6-place	ea.	5.60
572	STAINLESS STEEL adapter, 2-place	ea.	6.00
573	STAINLESS STEEL adapter, 3-place	ea.	6.00
575	STAINLESS STEEL insert, 20-place	ea.	6.00

MISCELLANEOUS ACCESSORIES FOR THE SORVALL CENTRIFUGES

BRUSHES

CAT. NO.	DESCRIPTION		PRICE
PE-61754	CARBON CONTACT BRUSH for RC2-B	pr.	3.00
PE-61483	CARBON CONTACT BRUSH for RC-3, Serial No. 70399 and lower	pr.	3.00
PE-11805	CARBON CONTACT BRUSH for RC-3, Serial No. 70400 and higher	pr.	3.00
PM-61809	CARBON CONTACT BRUSH for RC-2, SS-1, SS-3, SS-4	pr.	1.60
PM-61924	CARBON CONTACT BRUSH for GLC-1	pr.	2.50
PM-61811	CARBON CONTACT BRUSH for Small and Medium Centrifuges	pr.	.80

FUSES

PE-60565	5 amps., for SS-1 Transformer, 230 volts	box of 5	.85
PE-61453	5 amps., for RC2-B, RC-2, RC-3, SS-3 Speed Control	box of 5	.85
PE-60484	8 amps., for SS-4, Serial No. 40799 and lower, 230 volts	box of 5	.85
PE-60527	10 amps., for RC-1 Centrifuge, SS-1 Transformer	box of 5	.85
PE-60384	15 amps., for SS-3, Serial No. 30999 and lower; 230 volts	box of 5	.85
PE-60384	15 amps., for SS-4, Serial No. 40799 and lower; 115 volts	box of 5	.85
PE-60477	20 amps., for SS-3, Serial No. 30999 and lower; 115 volts	box of 5	.85

TRANSFORMERS/RHEOSTATS

PE-60533B	POWERSTAT, 10B, 115 volts, for Small and Medium Centrifuges	ea.	21.00
PE-60534	RHEOSTAT, Type L, 230 volts, for Small and Medium Centrifuges	ea.	24.00
PE-60700	POWERSTAT, 226-S3, 230 volts, for SS-1	ea.	56.25
PE-60701	POWERSTAT, 116-S3, 115 volts, for SS-1	ea.	30.00

ACCESSORIES

1002	PROTECTIVE GUARD of perforated steel for A, XL, M, SP, and SP/X Centrifuges	ea.	45.00
1004	PROTECTIVE GUARD of perforated steel for SS-1 Centrifuge	ea.	45.00
1007	VEEDER-ROOT CLUTCH REVOLUTION COUNTER, for Small and Medium Angle Centrifuges	ea.	10.65
1009	JAQUET PRECISION SPEED INDICATOR, range 0-20,000 rpm, complete with 4 tips and carrying case, for SORVALL Small, Medium and SS-1 Superspeed Angle Centrifuges	ea.	66.25
1010G	GRALAB UNIVERSAL TIMER, Model No. 167, 115 volts, 60 cycles, AC	ea.	42.00
1010G5	GRALAB UNIVERSAL TIMER, Model No. 167, 220 volts, 50 cycles, AC	ea.	45.00
1011	EXTENSION CORD, 3-wire, 6 ft. long	ea.	1.75
1012	STAINLESS STEEL HOOK for SS-1 and SS-34 Rotors	ea.	.55
1014	WRENCH for Nos. 518 and 518C covers	ea.	2.00
1015	TWISTED WIRE BRUSH for cleaning SS-1 and SS-34 Rotor compartments	ea.	1.85
1023	STAINLESS STEEL HANDLE for removing No. 437 adapter from GSA Rotor compartment	ea.	1.00
1024	CARRYING HANDLE for GSA Rotor (15/16″ — 20 thread)	ea.	4.85
1030	RESERVOIR TRAY for KSB-3, KSB-4 and KSB-R	ea.	15.00
1031	CARRYING HANDLE for SS-34, SM-24 and SE-12 Rotors	ea.	1.25
1032	"34-56 VISUAL-RAC" Tube Carrier for 8 x 50 ml. tubes for SS-1, SS-34, XL and SP/X Rotors	ea.	17.50
1035	OMNI-CAB for SORVALL Centrifuges and other Laboratory Instruments	ea.	145.00
1036	AUTOMATIC SAFETY VALVE for KSB-3, KSB-4 and KSB-R Continuous Flow Systems, stainless steel and KEL-F construction; connector for outlet on SS-3, SS-4, RC-2 and RC2-B Centrifuges	ea.	40.00
1037	TWISTED WIRE BRUSH for cleaning SM-24 and SE-12 Rotor compartments	ea.	1.75
1038	TWISTED WIRE BRUSH for cleaning GSA Rotor compartments	ea.	2.25
1039	SORVALL AMMETER, black plastic housing, range 0-10 amps, for connection between transformer and SS-1 Centrifuge motor assembly and other applications where amperage measurements are desired	ea.	17.00
1042	BASE PLATE for Small and Medium Centrifuges	ea.	20.00
1046	REMOTE CONTROL CONNECTION CORD, 15 ft. for SS-4	ea.	18.50
1047	CARRYING HANDLE for GS-3 and GSA Rotors (5/8″ — 16 thread)	ea.	4.85
1052	CARRYING HANDLE for BR-4, BR-4T and HG-4 Rotors	ea.	9.00
1053	CARRYING HANDLE for GS-33 Rotor	ea.	4.85
1054	RECEPTACLE for RC2-B and RC-3 line plugs (Hubbell #9340)	ea.	5.00
PM-60029	LOCKING WRENCH, 5/8″ open end for Nos. 552 and 558 covers	ea.	1.25
PM-60365	NEOPRENE "O" RING for Cap Top Screw for Nos. 552 and 558	ea.	.15
PM-60809	NEOPRENE "O" RING for No. 552 Cap Cover	ea.	.30
PM-61892	NEOPRENE "O" RING for No. 558 Cap Cover	ea.	.30

Refer to separate rotor bulletins for detailed information on tubes and adapters, their capacities, materials, dimensions, and relative centrifugal forces

Properties and characteristics of SORVALL centrifuge tubes are discussed in a newly produced four-page brochure, available upon request

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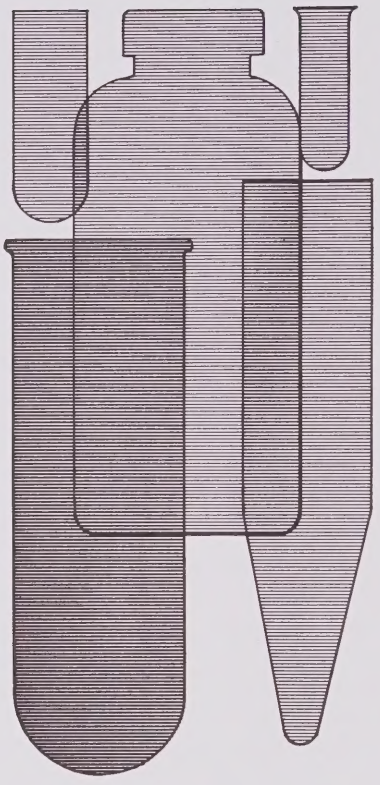
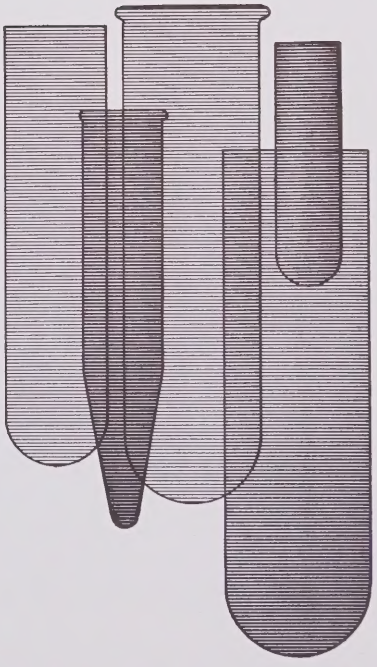
SOME PROPERTIES AND CHARACTERISTICS OF SORVALL® CENTRIFUGE TUBES





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SOME PROPERTIES AND CHARACTERISTICS OF SORVALL®

Because of the increasing number of plastic and other materials currently being used for centrifuge tubes, bottles, and adapters, we have drawn together in this bulletin their major comparative points of importance. A Chemical Resistance Chart will help the potential user of *plastic* centrifuge containers in selecting the most appropriate material.

The materials covered in this bulletin are Pyrex, Corex, Polyethylene, Autoclavable Polypropylene, Autoclavable Polycarbonate, Cellulose Nitrate, Autoclavable Nylon, Autoclavable KEL-F and Stainless Steel. We describe briefly these basic materials and then for Plastic Tubes present, in chart form, various comparative characteristics.

PYREX: Now a laboratory "standard," this borosilicate glass offers excellent chemical resistance. Available in many sizes, when used with proper adapters Pyrex will withstand high speeds reliably.

COREX: A recent development by Corning, this material offers four to six times the strength of conventional glass. More resistant to alkalies and acids, Corex resists etching and scratching and is unaffected by temperatures up to 300°C. In proper adapters, Corex tubes may be used to top instrument speeds.

POLYETHYLENE: A milky white translucent material, Polyethylene is not Autoclavable. It is excellent for centrifuging at low temperatures and has wide chemical resistance; it may be used with acids, alkalies, salt and aqueous solutions. For applications involving organic acids, essential oils, halogens, strong oxidizing agents and aromatic, aliphatic and chlorinated hydrocarbons, polyethylene tubes and bottles should be tested before general use.

AUTOCLAVABLE POLYPROPYLENE: Having the same wide chemical resistance as Polyethylene, Polypropylene *is* autoclavable and has greater transparency. It offers higher temperature limits than Polyethylene, but is less satisfactory for work at low temperatures. Although Polypropylene is affected by organic solvents and oxidizing agents, an unsatisfactory rating in the chemical resistance chart for either Polyethylene or Polypropylene may not disqualify these plastics for short-term centrifugation. Especially at ambient temperatures or lower, both plastics have excellent short-term chemical resistance (particularly to solvents) and would be affected only after long-term exposure.

AUTOCLAVABLE POLYCARBONATE: A clear material, Polycarbonate is one of the strongest plastics currently in use. It is autoclavable, resistant to various alcohols, dilute aqueous acids and neutral salt and saline solutions. It is slowly attacked by very dilute concentrations of bases such as amines, ammonia and alkalies. Polycarbonate is not recommended for use with chlorinated and aromatic hydrocarbons, p-dioxane, ketones, esters, nitrobenzene, phenol, cresols and some acid and basic substances. Liquids such as alcohols or bleaches are listed "satisfactory" in the Chemical Resistance Chart; however, if they have a pH greater than 7, the material may perform unsatisfactorily and stress crack. Pre-use testing is recommended.

CELLULOSE NITRATE: A strong transparent thermoplastic material, Cellulose Nitrate may generally be used satisfactorily with weak salt solutions, weak acids, and very weak bases, as well as aromatic and chlorinated hydrocarbons. In general, concentrated solutions of acids and bases attack Cellulose Nitrate, as will most solvents such as alcohols, esters, aldehydes, ethers and ketones. Solvent materials attack most aggressively. Because of its chemical structure, Cellulose Nitrate cannot be used near heat or autoclaved.

NYLON: Translucent and autoclavable, Nylon offers substantially inert resistance to organic acids, hydrocarbons, ketones, alcohols with the exceptions being formic and carbolic (phenol) acids, metacresol, cresylic acid and xylenol, oxidizing agents and mineral acids. Nylon tubes will withstand high speed without failure.

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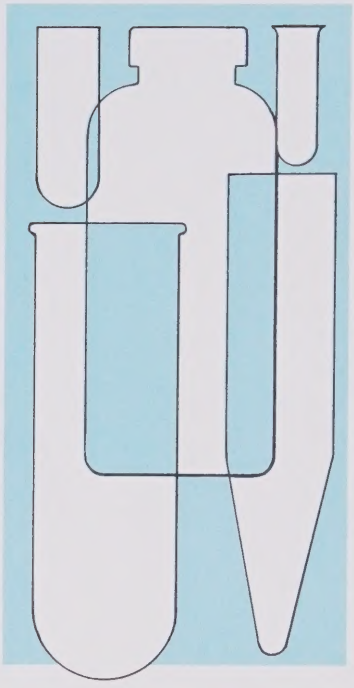
CENTRIFUGE TUBES

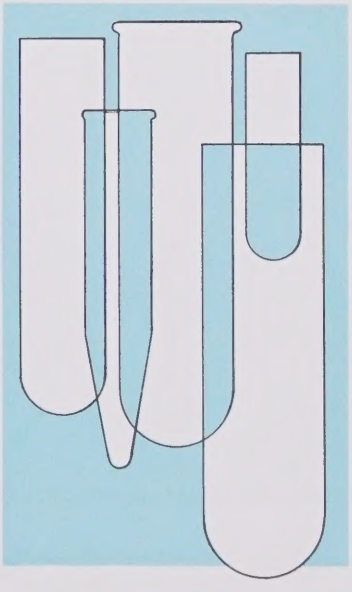
KEL-F: A polymer of trifluorochloroethylene, KEL-F is chemically inert, resistant to high temperatures, and has low absorption qualities. It is impervious to corrosive material and is highly resistant to most organic solvents. This material is generally used as a spray-coated lining on Stainless Steel Tubes and Bottles.

STAINLESS STEEL: Used as holders or tubes, this material offers advantages to particular areas of study where specific chemical resistance *and* high speed capabilities are required. Tubes are generally also available with Autoclavable KEL-F lining for special applications.



GENERAL PHYSICAL PROPERTIES OF PLASTIC MATERIALS: The following information has been gathered from various sources in an effort to provide as complete information as possible regarding the general physical properties of the listed materials. All information contained herein is presented as a guide and is subject to variation and change. For any work other than routine laboratory experiments, we strongly suggest pre-testing sample lots before proceeding on a large scale.

	Temp. Limit °C	Brittle Temp. °C	Specific Gravity	Tensile Strength psi	Water Absorp. %
POLYETHYLENE	80	−50	.92	2,000	0.01
AUTOCLAVABLE POLYPROPYLENE	135	0	.90	5,000	0.01
AUTOCLAVABLE POLYCARBONATE	135	−100	1.20	8,000	0.35
CELLULOSE NITRATE	60	0	1.35	7,000	1.0
AUTOCLAVABLE NYLON	200	−100	1.10	11,300	8.0
AUTOCLAVABLE KEL-F	200	−196	2.1	3,000	.01



CHEMICAL RESISTANCE GUIDE FOR PLASTIC TUBES: The chemical resistance data presented on the following pages are intended to act merely as a guide for the selection of applicable materials. Because of the mechanical stresses developed under centrifugation, plastics which may perform satisfactorily in a stationary application, may fail when subjected to centrifugal force. There are, unfortunately, no organized chemical resistance data under centrifugation for these various materials and we again suggest that individual samples be tested prior to use.

See Over for Chemical Resistance Chart for Plastic Tubes

CHEMICAL RESISTANCE CHART FOR PLASTIC TUBES

Reagent	Polyethylene Polypropylene	Polycarbonate	Cellulose Nitrate	Nylon	Kel-F
Acetaldeyhde (100%)	M	U	U	—	—
Acetic Acid (5%)	S	S	S	S	S
Acetic Acid (60%)	M	U	U	S	S
Acetic Acid (Glacial)	U	U	U	—	—
Acetone	S	U	U	S	S
Acid Cleaning Solution	M	U	U	—	—
Allyl Alcohol	S	S	U	S	—
Alum, Concentrated	S	—	—	S	—
Aluminum Chloride	S	S	S	S	—
Aluminum Fluoride	S	U	—	S	—
Ammonium Acetate	S	S	†	—	—
Ammonium Carbonate	S	U	S	S	—
Ammonium Hydroxide (10%)	S	U	U	S	S
Ammonium Hydroxide (Conc.)	S	U	U	S	—
Ammonium Persulfate (Sat'd.)	S	—	—	—	—
Ammonium Sulfide	S	U	—	S	—
Amyl Alcohol	S	S	U	S	—
Aniline	M	—	—	—	S
Aqua Regia	U	U	U	—	S
Benzene	U	U	S†	S	S
Benzyl Alcohol	U	U	U	S	S
Boric Acid	S	S	S	S	—
Brine	S	S	S	S	—
N-Butyl Alcohol	S	S	U	S	S
Calcium Chloride	S	M	S	S	S
Calcium Hypochlorite	S	S	—	S	—
Carbon Tetrachloride	U	U	S	S	S
Cetyl Alcohol	S	—	U	S	—
Chlorine Water	S	S	S	—	—
Chlorobenzene	U	U	U	—	—
Chloroform	U	U	M	S	—
Chromic Acid (10%)	S	S	U	—	—
Chromic Acid (50%)	S	U	U	—	—
Citric Acid (10%)	S	S	S	S	—
Cresol	M	U	—	U	S
Cyclohexyl Alcohol	S	—	U	S	—
Diacetone	S	—	U	—	—
Diazo Salts	S	—	—	—	—
Diethyl Ketone	M	U	U	S	—
Dimethylformamide	S	U	—	—	—
Dioxane	M	U	U	—	S
Distilled Water	S	S	S	S	S
Ether Diethyl	M	U	U	—	—
Ethyl Acetate	S	U	U	S	M
Ethyl Alcohol (50%)	S	S	S	S	S
Ethyl Alcohol (95%)	S	S	U	S	S
Ethylene Dichloride	U	U	U	S	—
Ethylene Glycol	S	S	S	S	—
Ferric Chloride	S	—	—	S	—
Fluoboric Acid	S	—	—	—	—
Formaldehyde (40%)	S	S	—	S	—
Formic Acid (100%)	S	M	U	U	S
Fuel Oil	M	S	—	S	—
Gallic Acid	S	—	—	S	—
Gasoline (Refined)	U	S	U	S	—
Gasoline (Sour)	U	U	U	—	—
2-Heptyl	S	—	U	—	—
Hydroformic Acid (100%)	S	—	—	—	—
Hydrochloric Acid (10%)	S	S	S	S	S
Hydrochloric Acid (50%)	S	S	U	—	—
Hydrochloric Acid (Conc.)	S	M	U	—	—
Hydrofluoric Acid (10%)	S	M	M	S	S
Hydrofluoric Acid (100%)	S	U	U	—	S
Hydrogen Peroxide (3%)	S	S	S	S	S
Hydrogen Peroxide (100%)	S	S	S	—	—
Hydroquinone	S	—	—	S	—

Reagent	Polyethylene Polypropylene	Polycarbonate	Cellulose Nitrate	Nylon	Kel-F
Isobutyl Alcohol	S	—	U	S	—
Isopropyl Alcohol	S	S	U	S	—
Lactic Acid (20%)	S	S	—	—	—
Lactic Acid (100%)	S	—	—	—	—
Lauryl Alcohol	S	—	U	S	—
Lead Acetate	S	—	S	—	—
Linseed Oil	S	S	S	—	—
Maleic Acid	S	—	—	—	—
Manganese Salts	S	—	S	—	—
Magnesium Hydroxide	S	U	U	—	—
Mercury	S	S	S	—	—
Methyl Alcohol	S	U	U	S	S
Methyl Ethyl Ketone	S	U	U	S	—
Methyl Salicylate	—	U	U	—	—
Methylene Chloride	S	U	U	—	S
Nickel Salts	S	S	S	—	—
Nitric Acid (10%)	S	S	S	M	S
Nitric Acid (50%)	S	M	M	M	S
Nitric Acid (95%)	U	U	U	U	S
Oleic Acid	S	S	S	S	S
Oxalic Acid	S	S	S	S	—
Perchloric Acid (10%)	S	—	—	—	S
Phenol	S	U	—	U	—
Phenyl Ethyl Alcohol	S	—	U	S	—
Phosphoric Acid (10%)	S	S	S	—	—
Phosphoric Acid (Conc.)	S	S	M	—	—
Phosphorus Trichloride	S	U	—	—	—
Potassium Acetate	S	M	—	—	—
Potassium Carbonate	S	—	S	S	—
Potassium Chlorate	S	S	S	S	—
Potassium Chloride	S	S	S	S	—
Potassium Hydroxide (5%)	S	U	S	S	S
Potassium Hydroxide (Conc.)	S	U	U	—	—
Potassium Permanganate	S	—	—	S	—
Silicic Acid	S	—	—	—	—
Silicone Fluids	M	—	—	—	—
Silver Cyanide	S	—	—	—	—
Soap Solutions	S	‡	‡	S	S
Sodium Bisulfate	S	S	S	S	—
Sodium Borate	S	S	S	S	—
Sodium Carbonate	S	S	S	S	S
Sodium Chloride (10%)	S	S	S	S	S
Sodium Chloride (Sat'd.)	S	—	—	S	—
Sodium Dichromate	S	—	—	S	—
Sodium Hydroxide (>1%)	S	U	S	S	S
Sodium Hydroxide (10%)	S	U	U	S	S
Sodium Hydroxide (Conc.)	S	U	U	S	—
Sodium Hypochlorite	S	S	S	S	—
Sodium Nitrate (10%)	S	U	—	S	—
Sodium Peroxide	S	—	—	S	—
Sodium Sulfide	S	U	S	S	—
Sodium Thiosulfate	S	S	—	S	—
Sulfuric Acid (10%)	S	U	S	S	S
Sulfuric Acid (50%)	S	S	U	M	S
Sulfuric Acid (75%)	S	S	U	U	S
Sulfuric Acid (Conc.)	U	S	U	U	S
Tannic Acid	S	—	—	S	—
Toluene	U	U	S†	S	S
Trichlorethylene	U	U	—	S	M
Trisodium Phosphate	S	M	—	—	—
Turpentine	M	U	U	S	—
Urea	S	S	S	S	S
Urine	S	S	S	S	S
Xylene	U	U	S†	U	S
Zinc Chloride	S	S	S	S	—

KEY

S Satisfactory.

M Moderate attack, may be satisfactory for use in a centrifuge depending on length of exposure, speed involved, etc.; suggest testing under actual conditions of use.

U Unsatisfactory, not recommended.

— Performance unknown; suggest testing, using a sample to avoid loss of valuable material.

† If pure.

‡ Because of the many types of soap solutions, it is impossible to predict performance.

CTP-J-5/67

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IVAN SORVALL, INC./Norwalk, Connecticut 06852

SORVALL®

"OMNI-CAB"
Cat. No. 1035

"OMNI-CAB" LABORATORY CABINET

For SORVALL Tabletop Centrifuges and other Laboratory Instruments

Large 27¼" x 21¼" stainproof, chemical-resistant Formica working top

- Slide-away work shelves
- "Peg-board" storage area on inside of doors
- Full-width, roll-out shelf
- Silent, rugged, ball-bearing casters
- Special corrosion-resistant finish of SORVALL gray enamel

The new SORVALL "OMNI-CAB" gives you more than any similar laboratory cabinet in working area, storage space, attractiveness of design, corrosion-resistant surfaces, compactness, and accessibility.

Edges are rounded for appearance and safety. Available for immediate delivery.

SPECIFICATIONS

Cat. No. 1035 SORVALL OMNI-CAB for SORVALL Centrifuges and other Laboratory Instruments. Chemical-resistant Formica top, gray enamel elsewhere, storage and work shelves. Mounted on casters. Adjustable locking stabilizers.

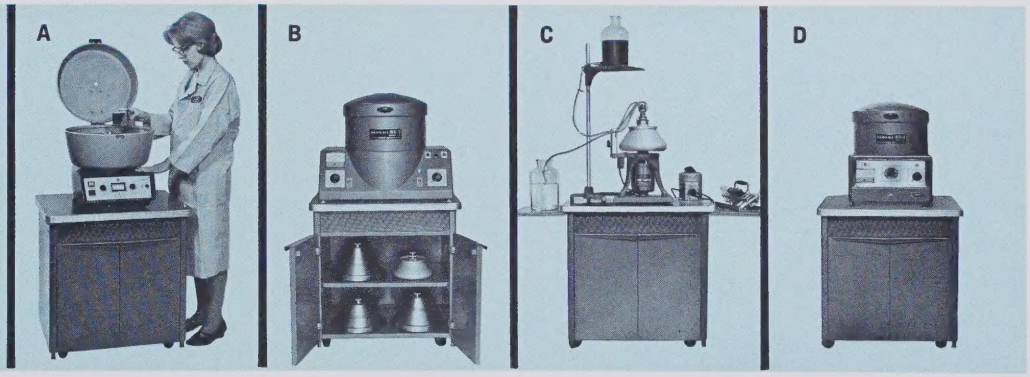
Dimensions:
Width — 27¼", Depth — 21¼", Height — 27"
Net Weight: 77 lbs., Shipping Weight: 90 lbs.

A Height allows easy access to rotor chamber and controls.

B Compact, functional, large working areas, adequate storage space.

C Space for a variety of instruments other than centrifuges.

D Attractive, unobtrusive appearance — turns a table-top centrifuge into floor model.



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SORVALL® PRODUCT GUIDE

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CENTRIFUGES & LABORATORY INSTRUMENTS

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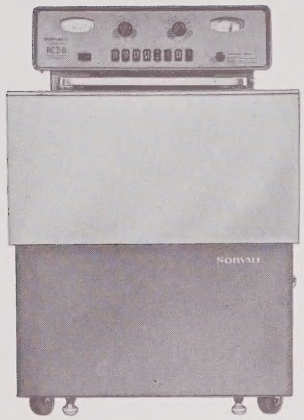
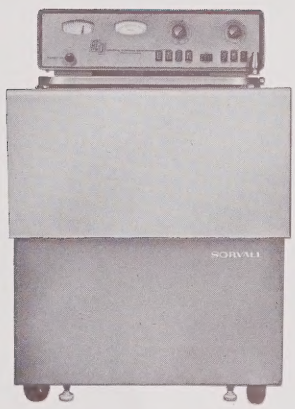


RC2-B — AUTOMATIC SUPERSPEED REFRIGERATED CENTRIFUGE

The reliability and versatility of the RC2-B have set an unequalled standard for performance. Users recommend its convenience for continuous flow, special, superspeed or routine low-temperature work. Automatic Controls aid in programming — just set it, start it, and leave it. A researcher only has to use the RC2-B for a short while in order to appreciate why it is considered vastly superior for either routine or special applications.

• RCF's to 49,500 x G with SM-24 Rotor (48,200 x G with 8 x 50 ml SS-34 Rotor) • Speeds to 20,000 rpm • Patented Gyro-Action Self-Centering Direct Drive • SORVALL Designed and Built High-Torque Motor • Unique Non-Modulating Speed Selector (See pg. 8) • Angle, Horizontal and Special-Purpose Rotors • Automatic Programmed Operation • Dynamic Braking • Smooth-Walled Stainless Steel Rotor Chamber • Adaptable to SORVALL "Szent-Gyorgyi & Blum" Tube-Type Continuous Flow System • Heavy-Duty Refrigeration System Maintains ± 1° C through all operational phases • Fully-Instrumented Control Panel • Combined Running-Holding Temperature Control • Two-Hour Timer with "Hold" for Longer Runs • Heavy Steel Safety Guard, Electrical Interlocks, Circuit Breakers • Unitized Construction • Stainless Steel Top and Apron — Non-Corrosive Finish

Accepts SS-34, SM-24, SE-12, GSA, GS-3, HB-4, SU Rotors — See Pages 6 & 7



RC-3 — GENERAL-PURPOSE AUTOMATIC REFRIGERATED CENTRIFUGE

The RC-3 was specially designed to speed processing times in clinical, biochemical, biological, bacteriological, and other routine applications. Automatic programming and the exact duplication of run after run are now possible. Many users have found the RC-3 to be ideal for centrifuging large quantities at gravities below 6,975 x G (with the HG-4 Rotor). It is the perfect companion unit for the Superspeed RC2-B.

With the increase in blood processing and the greater demand for blood and its components, the RC-3 is proving to be an invaluable tool in hematological research and blood bank procedures.

• RCF's to 6,975 x G with HG-4 Rotor • Speeds to 5000 rpm • Automatic Programmed Acceleration with all Rotors • Dynamic Braking • Rapid Acceleration even with Large Loads • Exclusive Speed Selector permits Automatic Acceleration to all speeds from 500 rpm to 5000 rpm — accurately maintains speeds regardless of line voltage fluctuations (See pg. 8) • Patented Gyro-Action Self-Centering Direct Drive • Wide Versatility with Angle, Horizontal and Special-Purpose Rotors • Convenient, Easy-to-Reach Control Panel • Smooth-Walled Stainless Steel Rotor Chamber with Drain • Heavy-Duty Refrigeration System • Preset Temperatures Accurately Maintained • SORVALL Designed and Built High-Torque Motor • Accurate Reproducibility of Runs • Stainless Steel Top and Apron — Non-Corrosive Finish • Large, Easy-Load Rotor Chamber Opening • Heavy Steel Safety Guard plus Electrical Interlocks, Circuit Breakers • Unitized Construction

Accepts HG-4, BR-4, BR-4T, HB-4, SS-34, SS-1R, SM-24, SE-12, GSA, GS-33, M-R, SP/X-R ROTORS — See Pages 6 & 7

GLC-1 — GENERAL LABORATORY CENTRIFUGE

The GLC-1 General Laboratory Centrifuge is a unique concept for routine centrifugation. SORVALL has utilized its many years of engineering and design experience in producing a compact, general centrifuge with power, versatility, and many features usually found only in expensive research centrifuges. Shortened "run time," automatic operation, and ease of maintenance make the stylishly functional GLC-1 the ideal "table-top" for the busy, modern lab.

• RCF's to 4,950 x G • Speeds to 6,000 rpm • Patented Gyro-Action Self-Centering Direct Drive • Rapid Acceleration even with Large Loads • Automatic Electric Brake — can be pre-set at beginning of run • Flashing Indicator during Braking Cycle • Twist-Off Removable Safety Guard • Full-Access Rotor Chamber • Angle Rotor Capacity to 575 ml • Horizontal Rotor Capacity 480 ml • Electric Tachometer 0-6,000 rpm • Thirty-Minute Timer (graduated in 30-second intervals with "Hold" provision for longer runs) • Electronic Solid-State Speed Control • Accepts standard tubes to 150 mm in length • Wide range of adapters including Omni-Carrier with removable stainless steel inserts for 10, 12, 13, 16, 18 mm O.D. tubes • No tools needed to remove or secure rotors • Easily absorbs tube imbalance — visual equalization only • Heavy-Duty Motor — Reserve Power

NOTE: *A model GLC — similar in all respects to the GLC-1, but not having the electric tachometer — is available at a slighty reduced price.*

Accepts A, XL, M, SP, SP/X, HL-4 Rotors — See Pages 6 & 7

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For Ordering Specifications refer to illustrated Price List

SS-3 — AUTOMATIC SUPERSPEED CENTRIFUGE

The most advanced automatic available. Unique acceleration and braking system with new Non-Modulating Automatic Speed Selector (see page 8). Just set it and forget it! A reliable versatile instrument able to perform all centrifuging functions within its speed range and where varying RCF's and rotors may be called for. It is equally at home duplicating batch operations or in special applications.

FEATURES OF THE SS-3 AND SS-4

• RCF's to 34,800 x G with SS-34 Rotor • Speeds to 17,000 rpm • Patented Gyro-Action Self-Centering Direct Drive • Capacities to 1,890 ml (with GSA Rotor — 14,600 x G) • Angle, Horizontal and Special-Purpose Rotors • Adaptable to SORVALL "Szent-Gyorgyi & Blum" Tube-Type Continuous Flow System • Dual Forced-Air Cooling • Controls alterable during operation • Full Instrumentation • Patented Steel Safety Guard — Special Safety Cover • Compact • Quiet Operation • Rotor Imbalance Safety Switch

SS-3 and SS-4 accept SS-34, SM-24, SE-12, GSA, HB-4, SU Rotors — See Pages 6 & 7

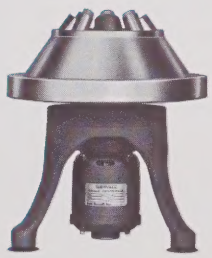
SS-4 — MANUAL SUPERSPEED CENTRIFUGE

The SS-4 offers all the advantages of the SS-3 with the exception of automatic acceleration and braking. In addition, its conveniently placed control panel snaps out for remote use of the rotor compartment section in cold rooms, fume hoods, etc. Somewhat more compact than the SS-3, the SS-4 is extremely popular where economy of space and budget are important factors.

SS-1 — SUPERSPEED ANGLE CENTRIFUGE

The SS-1 Angle Superspeed Centrifuge has a world-wide reputation as a reliable, rugged performer. It is easy to operate, smooth-running and stable.

• RCF's to 31,000 x G • Speeds to 16,000 rpm • Unique SORVALL-Blum Self-Centering Direct Drive • SORVALL "Szent Gyorgyi & Blum" Tube-Type Continuous Flow System adaptable • Anodized Aluminum-Alloy Rotor — Air-Tight Cover for protection against hazardous materials • Rugged Construction • Lightweight, Compact, Portable • Great Variety of Tubes and Adapters

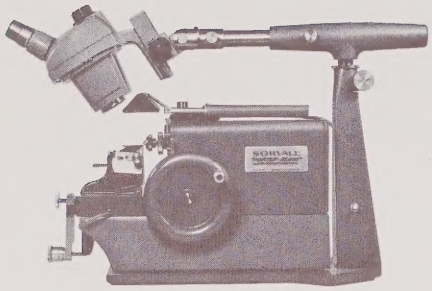


SMALL AND MEDIUM CENTRIFUGES

The Small and Medium Angle Centrifuges are truly versatile and inexpensive. They are ideal for chemical, clinical, blood, bacteriological, hospital, and industrial labs of all kinds.

- **RCF's to 4,340 x G with A and XL**
  3,440 x G with M and SP/X
  3,300 x G with SP
- **Speeds to 6,000 rpm with A and XL**
  Speeds to 5,000 rpm with M, SP/X and SP
  • Five Rotors — A, XL, M, SP, SP/X — useable on one motor base — See pages 6 & 7.
  • Self-Centering Direct Drive • Numerous Tube Combinations from 1 ml to 80 ml

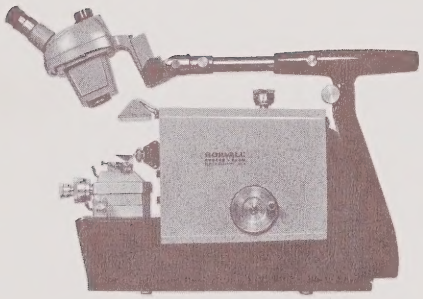
For Ordering Specifications refer to illustrated Price List



MT-1 "Porter-Blum" ULTRA-MICROTOME

Precision and simplicity of sectioning have made the MT-1 the world's most widely used instrument for both teaching and research. The MT-1 can cut a wide variety of materials and can be equipped with many accessories to increase versatility.

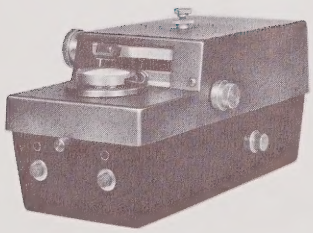
• Cutting Range from 1/40 to 1/2 micron • Alternate Thin and Thick Sectioning • "Porter-Blum" Mechanical Advance • Cuts High-Quality Uniform Serial Sections • Accepts Glass or Diamond Knives • Dial-Control Thickness Selector • Accommodates different types of stereomicroscopes • Trouble-free operation • Compact, readily portable



MT-2 "Porter-Blum" ULTRA-MICROTOME

The MT-2 is the most advanced ultra-microtome available. Every component is designed to bring maximum accuracy to bear on the optimum sectioning point. Check the features of this "New Dimension in Ultra-Microtomy."

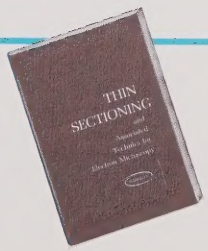
• Cutting range from 100 Å to 4 μ — dial-controlled • Alternate Thin and Thick Sectioning • Stepless Cutting Speed Adjustment from 0.09 to 3.2 mm/sec. • "Porter-Blum" Mechanical Advance • Orientation scales provide "memory" feature • Stage Assembly, Knife Edge, Specimen Holder all pivot on optimum sectioning point • Knife Stage Assembly Micrometers for lateral and forward precision movements • Automatic Power Drive or Manual Drive • Unique Rear-Mounted Pivoting Stereomicroscope Arm • Built-in Cold Light Source with Diffuser • Precision Specimen Trimming with the instrument itself • Unitized Construction



TC-2 "Smith & Farquhar" TISSUE SECTIONER

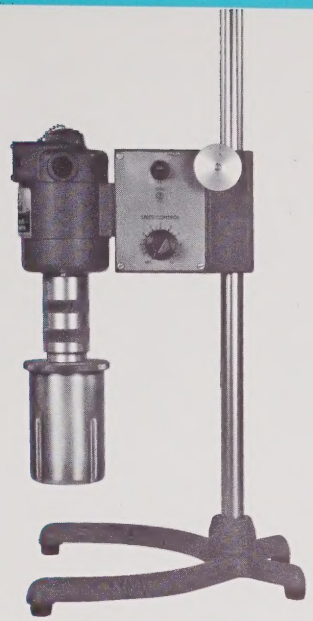
The TC-2 represents a major advance in tissue cutting technique. It provides a method for rapid cutting of fixed — and certain non-fixed — tissues for electron microscope preparation, without using a "freeze-thaw" cycle. The "freeze-thaw" cycle, common to cryostat sectioning, disrupts fine cellular structure, decreases enzyme activity, and causes enzyme diffusion. The TC-2 is a valuable instrument for studies in cytochemistry, histology, and related fields. The TC-2 offers ease of operation, automatic facilities, and a selection of forces, cutting speeds, and sectioning ranges.

• Cutting range 5 microns to 230 microns • Speed Range variable from 50 to 200 strokes per minute • Specimen size up to 20 mm square — up to 3 mm thick • Fingertip removal of holding ring permits rapid mounting and demounting of specimen • Maximum stage travel 25 mm • Dial adjustment of cutting force • Stroke-length of cutting arm easily adjustable • Accepts standard single-edge injector blades • Blade Holder angled at 5° for section reproducibility • Dial Controls for operator convenience • Indicator Lights for operating cycle • Compact, modern design



"THIN SECTIONING & ASSOCIATED TECHNICS FOR ELECTRON MICROSCOPY" ILLUSTRATED — 3rd EDITION, COMPLETELY REVISED — OVER 120 PAGES $3.00 per copy

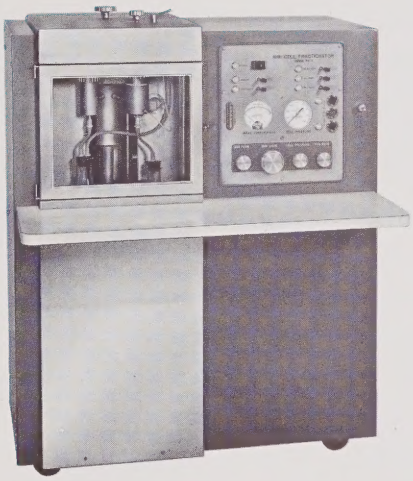
For Ordering Specifications refer to illustrated Price List



OMNI-MIXER MICRO-MACRO HOMOGENIZER

A highly-versatile instrument for the homogenizing, mixing, blending, disintegrating, etc. of many materials. Capacities from 0.5 ml to approximately 2,000 ml. Micro attachment for smaller capacities to 5 ml and speeds to 50,000 rpm. Ordinary Mason jars take large volumes of light liquids. Various size Stainless-Steel Chambers and Rotor Knife Assemblies available (see detailed Ordering Specifications and Price List).

• Top Drive facilitates recovery of homogenate • Optional Chambers include Stainless Steel, Mason Jars, Tubes and Bottles • Sealed Chambers immersible for temperature control • Chambers, Covers, and Rotor Knife Assemblies autoclavable • Heavy-Duty, High-Torque, Ball-Bearing Equipped Motor • Electronic Speed Control • Lightweight, Portable • Vibrationless Operation

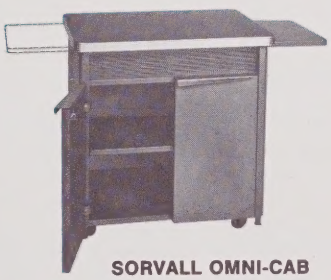


RF-1 — SORVALL-RIBI REFRIGERATED CELL FRACTIONATOR

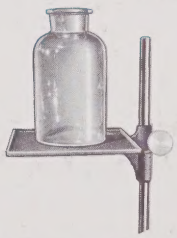
Bacteria, fungi and tissue cells can be disrupted under controlled conditions thereby permitting their walls to be separated from cytoplasm by centrifugation. Cell walls of many microorganisms, from which greatly improved experimental vaccines have been made, may now be obtained in sufficient quantities for large scale experimentation. Fundamental subcellular substances such as enzymes, microsomal particles and nucleic acids may be isolated from the cytoplasmic fraction in an unaltered state.

• Pressures up to 60,000 lbs. p.s.i. can be applied to cell suspension with 1.5″ dia. pressure cell • Close control of hydraulic pressures and flow rates • Effluent can be cooled to 0°C • Controls grouped for ease of operation • Pressure cell mounted on convenient swing-out bracket • Large "counter-top" work space • Compactly designed — may be moved through standard door

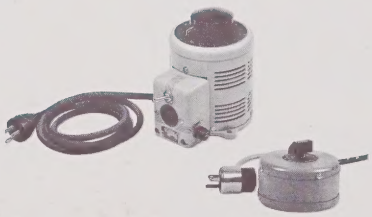
A Valuable New Tool for Biomedical Research.



SORVALL OMNI-CAB
Cat. No. 1035

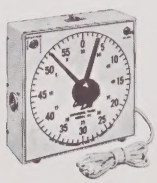


SORVALL RESERVOIR TRAY
Cat. No. 1030

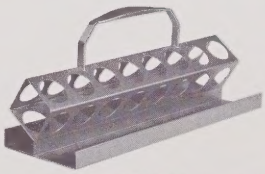


VARIABLE TRANSFORMERS AND RHEOSTATS

SPEED INDICATORS
Veeder-Root, Jaquet



INTERVAL TIMERS



SORVALL "34-56" VISUAL RAC
Cat. No. 1032

For Ordering Specifications refer to illustrated Price List

SORVALL SS-34 Rotor

- 8 Places for 50 ml Tubes
- 34° Angle Superspeed Rotor

MAXIMUM ROTOR SPEED

Centrifuge	RC2-B	RC-2	SS-3 & SS-4	RC-3
Max. RPM	20,000	17,500	17,000	5,000
Max. RCF	48,200	37,000	34,800	3,015

SORVALL SS-1 Rotor

- 8 Places for 50 ml Tubes
- 34° Angle Superspeed Rotor

Centrifuge	SS-1	RC-3 (SS-1R)
Max. RPM	16,000	5,000
Max. RCF	31,000	3,015

SORVALL SM-24 Rotor

- 24 Places for 15 ml Tubes
- 28° Angle Superspeed Rotor

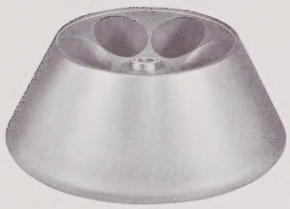
Centrifuge	RC2-B	RC-2	SS-3 & SS-4	RC-3
Max. RPM	20,000	16,000	16,000	5,000
Max. RCF	49,500	31,500	31,500	3,080

SORVALL SE-12 Rotor

- 12 Places for 15 ml Tubes
- 40° Angle Superspeed Rotor

Centrifuge	RC2-B	RC-2	SS-3 & SS-4	RC-3
Max. RPM	20,000	20,000	20,000	5,000
Max. RCF	41,435	41,435	41,435	2,590

NOTE: *Recommended for procedures requiring rapid acceleration and time-limited runs (acceleration to 20,000 rpm in 40 seconds with RC2-B).*



SORVALL GSA Rotor

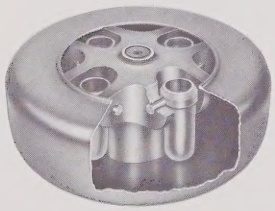
- 6 Places for 250 ml Bottles
- 28° Angle Rotor

Centrifuge	RC2-B	RC-2	SS-3 & SS-4	RC-3
Max. RPM	13,000	9,500	9,500	5,000
Max. RCF	27,500	14,700	14,700	4,080

SORVALL GS-3 & GS-33 Rotor

- 6 Places for 500 ml Bottles
- 25° Angle Rotor

Centrifuge	RC2-B (GS-3)	RC-3 (GS-33)
Max. RPM	9,000	5,000
Max. RCF	14,700	4,500



SORVALL HB-4 Rotor

- 4 x 50 ml Swinging-Bucket Rotor
- Titanium Yoke and Buckets
- Anodized Aluminum Shell

Centrifuge	RC2-B	RC-2	SS-3 & SS-4	RC-3
Max. RPM	13,000	10,000	9,000	5,000
Max. RCF	27,500	16,300	13,200	4,080

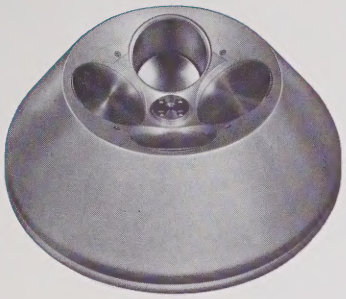
SORVALL SU Rotor

- 8 Cells
- Virus/Particle Counting Rotor
- Cells of Lucite in Stainless Steel Housing

Centrifuge	RC2-B	RC-2	SS-3	SS-4
Max. RPM	20,000	20,000	20,000	20,000
Max. RCF	31,500	31,500	31,500	31,500

Users of early model SORVALL Refrigerated Centrifuges should note that SS-34, SM-24, SE-12, GSA, HB-4, & SU Rotors are available for use with the RC-1 & the RC-2.

Separate Rotor Bulletins are available detailing specifications of Tubes and Adapters, and giving RCF's and recommended limiting speeds.



SORVALL BR-4
General-Purpose Rotor

- Four x 600 ml Stainless Steel Cups with Screw Covers
- 34° Angle Rotor

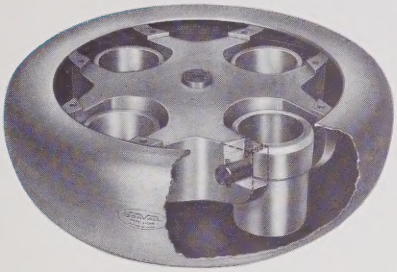
MAXIMUM ROTOR SPEED

Centrifuge	RC-3
Max. RPM	5,000
Max. RCF	5,140

SORVALL BR-4T Rotor

- Four x 600 ml Stainless Steel Cups with Teflon Coated Interior
- 34° Angle Rotor

Centrifuge	RC-3
Max. RPM	5,000
Max. RCF	5,140



SORVALL HG-4 Rotor

- Four x 650 ml Buckets
- Swinging Bucket Rotor

Centrifuge	RC-3
Max. RPM	5,000
Max. RCF	6,975

NOTE: *Recommended for Blood Centrifugation and for general use in Research, Industrial and Clinical Laboratories.*

SORVALL Type HL-4
Horizontal Rotor

- 4 Place for 100 ml Buckets
  8 Place for 50 ml Buckets
- Accepts Omni-Carrier with Stainless Steel Inserts

HL-4 Maximum Rotor Speed in GLC-1			
	100 ml Bucket	50 ml Bucket	Omni-Carrier with Inserts
Max. RPM	2600	3200	2600
Max. RCF	1545	2072	1239

SORVALL Type "A" Rotor

- 12 Places for 20 ml Tubes
- 35° Angle Rotor

Centrifuge	GLC-1	Small & Medium
Max. RPM	6,000	6,000
Max. RCF	4,340	4,340

SORVALL Type "XL" Rotor

- 4 Places for 50 ml Tubes
  4 Places for 20 ml Tubes
- 35° Angle Rotor

Centrifuge	GLC-1	Small & Medium
Max. RPM	6,000	6,000
Max. RCF	4,340	4,340

SORVALL Type "M" Rotor

- 27 Places for 15 ml Tubes
- 35° Angle Rotor

Centrifuge	GLC-1	Small & Medium	RC-3
Max. RPM	6,000	5,000	5,000
Max. RCF	4,950	3,440	3,440

SORVALL Type "SP" Rotor

- 6 Places for 80 ml Tubes
- 35° Angle Rotor

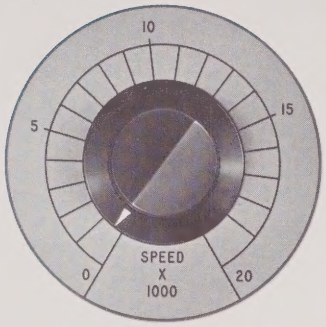
Centrifuge	GLC-1	Small & Medium
Max. RPM	6,000	5,000
Max. RCF	4,740	3,300

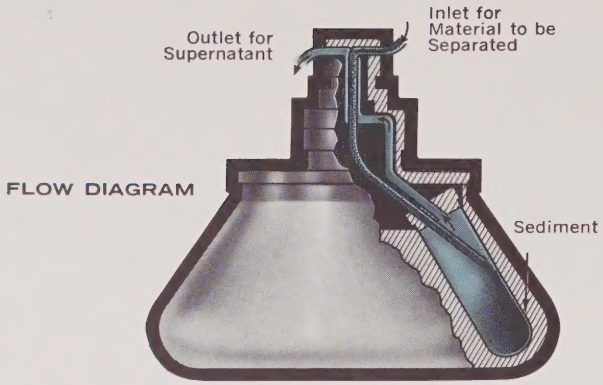
SORVALL Type "SP/X" Rotor

- 10 Places for 50 ml Tubes
  5 Places for 15 ml Tubes
- 35° Angle Rotor

Centrifuge	GLC-1	Small & Medium	RC-3
Max. RPM	6,000	5,000	5,000
Max. RCF	4,950	3,440	3,440

"A," "XL," "M," "SP" and "SP/X" Rotors, Covers and Tube Holders are stainless steel. All other rotors, except the HB-4, are anodized-aluminum alloy. The HB-4 Rotor is of titanium alloy and aluminum. All Rotors except the HL-4 have Covers. The SS-1, SS-34, SM-24, GSA, HB-4 and SE-12 covers are airtight.





The SS-3, RC2-B and RC-3 are equipped with our exclusive Automatic Non-Modulating Speed Selector. This permits rapid, automatic acceleration rate to all speeds from 500 rpm to top speed. Its chief benefits to the user are its capability of maintaining extremely accurate speed settings, and its disregard for fluctuations in line voltage. Total running time to achieve desired separation is shorter than ever. This selector is of compatible design and may be installed on units previously purchased.

"Szent-Gyorgyi & Blum" KSB TUBE-TYPE CONTINUOUS FLOW

The SORVALL KSB is designed for continuous flow application where the inconvenience of bulk, or bucket-type, collection is unwanted. Tube-Type collection is cleaner, faster, and does not "lose" small amounts of sediment, as can other systems. Collection of precipitate is effected right in the centrifuge tubes and consequently remixing of sample during processing and transferal steps is greatly reduced.

• Collection in 8, 4, or 2 tubes • Up to 48,200 x G may be applied • Flow rates up to and in excess of 500 ml/minute • 250 ml to 350 ml of precipitate may be obtained in one operation • Clarifies liquids • Large quantities of sample may be processed • Angle Principle plus Tube Collection speeds sedimentation • Titanium and Stainless Steel Construction • Utilizes standard 8 x 50 ml SORVALL SS-1, SS-34 Superspeed Rotors • System can be completely closed • Easy to set up, operate, and maintain • Safety Valve, 4-Tube and 2-Tube Distributors, optional extras

For Ordering Specifications refer to illustrated Price List

INSTRUMENTS PATENTED AND PATENTS PENDING

KSB "Szent-Gyorgyi & Blum" Continuous Flow System
SORVALL-Blum Gyro-Action Direct Drive for the SS-3, SS-4, RC2-B, RC-3, and GLC-1 Centrifuges
MT-1 and MT-2 "Porter-Blum" Ultra-Microtomes
TC-2 "Smith & Farquhar" Tissue Sectioner
SORVALL Ribi RF-1 Refrigerated Cell Fractionator
Micro-Attachment for the Omni-Mixer
Safety Guard and Cover for the SS-3 and SS-4 Superspeed Centrifuges
Imbalance Safety Switch for the SS-3 and SS-4 Superspeed Centrifuges
Non-Modulating Speed Selector for the SS-3, RC2-B, and RC-3 Centrifuges

This is a guide to the SORVALL line, not a General Catalog. Separate literature is available for individual products and their accessories. We shall be happy to send you illustrated, descriptive brochures for any SORVALL instrument. Please use the accompanying reply cards for your requests.

IVAN SORVALL INC.
NORWALK • CONNECTICUT • 06852

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